tember 1947

Chemical Industries

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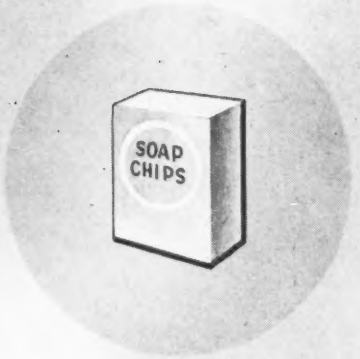
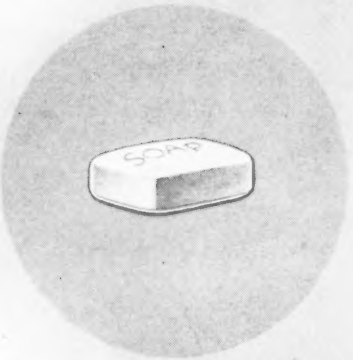
THROUGH THE YEARS...

UNCHALLENGED QUALITY



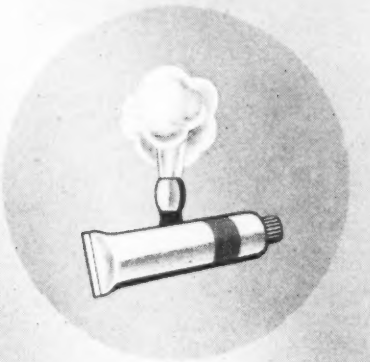
TRADE REG. U.S. MARK PAT. OFF.



SOLVAY PRODUCTS

TRADE MARK REG. U. S. PAT. OFF.

FOR SOAP MANUFACTURERS



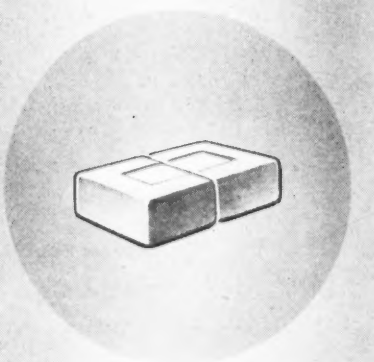
Caustic Potash

Caustic Soda

Soda Ash

Potassium Carbonate

Calcium Chloride

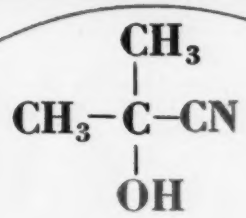


SOLVAY SALES CORPORATION

Alkalies and Chemical Products Manufactured by The Solvay Process Company

40 RECTOR STREET NEW YORK 6, N. Y.

Available in COMMERCIAL QUANTITIES



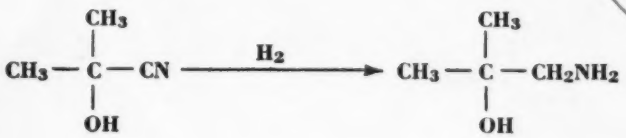
ACETONE CYANOHYDRIN

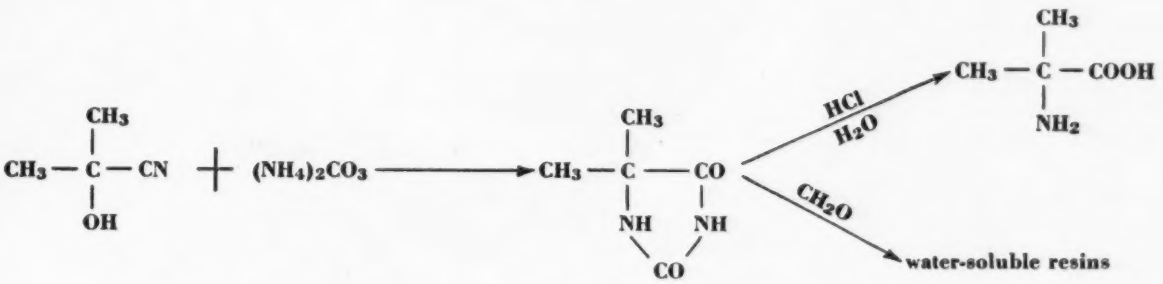
PROPERTIES

Boiling point	**82° C at 23 mm.**
Specific gravity	**0.932 at 19° C**
	0.925 at 25° C
Purity	**97-98%**

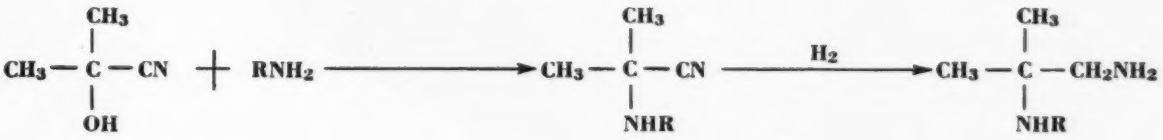
Infinite solubility in water and alcohol. In general, has solubility similar to tertiary butyl alcohol.

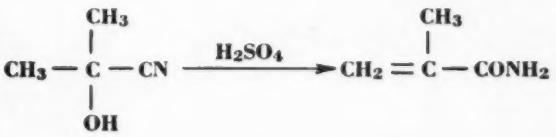
This versatile bifunctional compound is now offered for consideration where reactions of the following types are of interest:

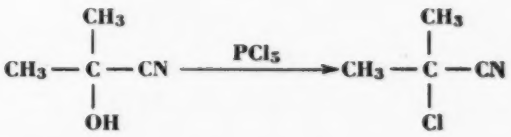




dimethyl hydantoin





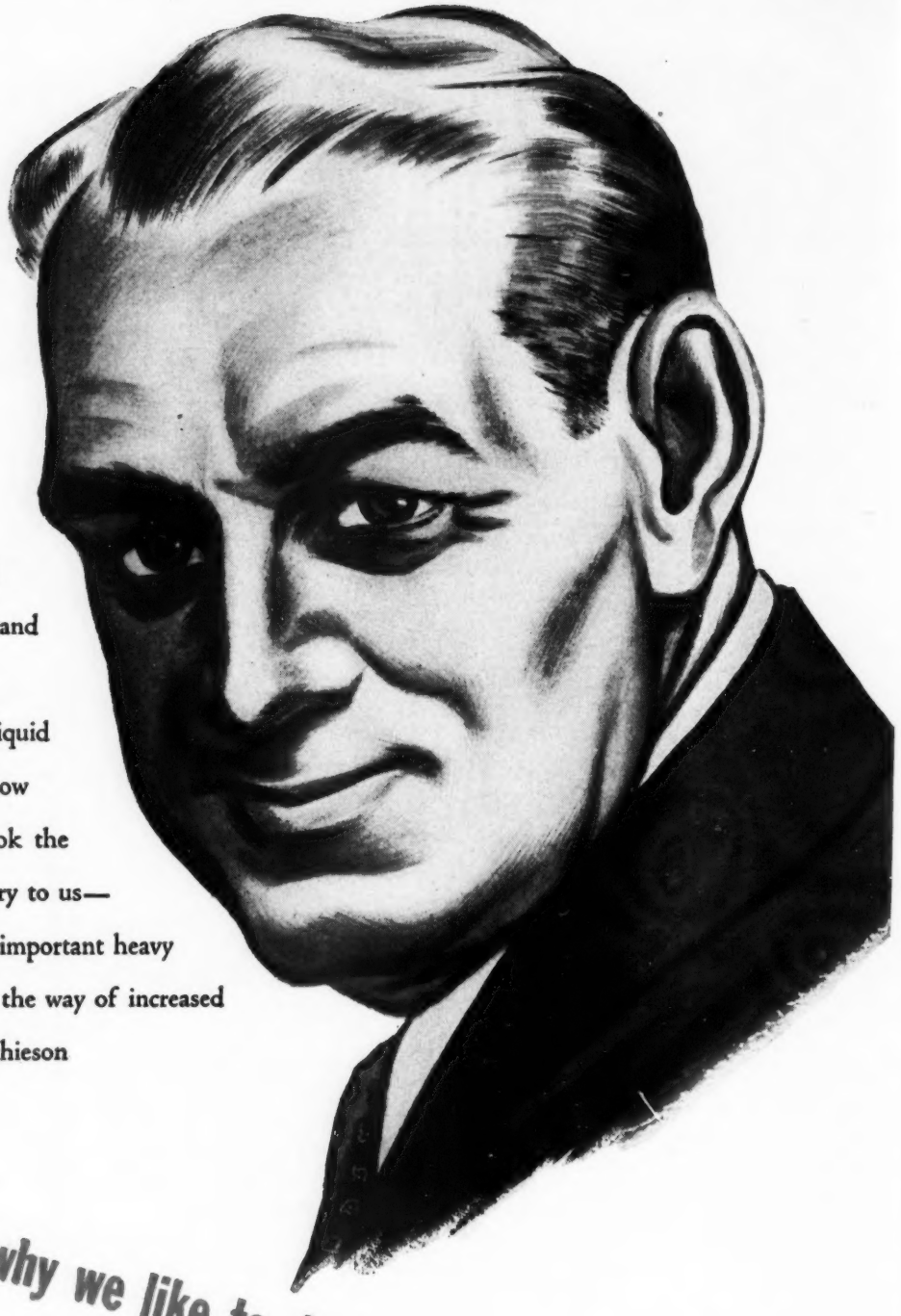


We shall be glad to supply samples of Acetone Cyanohydrin, and literature giving further details of these and other reactions. Address your inquiries to Dept. SP.

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Manufacturers of Chemicals including Plastics • Synthetic Insecticides • Fungicides • Enzymes • Detergents
Germicides • Chemicals for the Leather, Textile, Ceramic, Rubber, Paper, Petroleum and other Industries



"In my business, we could use more caustic soda, soda ash and sodium bicarbonate than we're getting . . . and that goes for liquid chlorine, too. But at least we know where we stand. Mathieson took the trouble to explain the whole story to us—why there's a shortage of these important heavy chemicals . . . what to expect in the way of increased supplies in 1947 and 1948. Mathieson always works with us . . .

. . . and that's why we like to do business with Mathieson!"*

**The foregoing is based on reactions to our advertisement—"Why you can't buy all the Caustic Soda, Soda Ash, Sodium Bicarbonate and Chlorine you want"—which appeared in many publications earlier this year.*
The Mathieson Alkali Works (Inc.),
60 East 42nd Street, New York 17, N. Y.

Mathieson
CHEMICALS

Caustic Soda . . . Soda Ash . . . Sodium Bicarbonate . . . Liquid Chlorine . . . Chlorine Dioxide . . . Ammonia, Anhydrous & Aqua . . . HTH Products . . . Fused Alkali Products . . . Dry Ice . . . Carbonic Gas Sodium Chlorite Products . . . Sodium Methylate

Chemical Industries

"SERVING THE CHEMICAL PROCESS INDUSTRIES"

VOLUME 61—NUMBER 3 **SEPTEMBER, 1947**

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A MACLEAN-HUNTER publication. Horace T. Hunter, President

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FOR

VINYL COPOLYMERS

POLYVINYL CHLORIDE

POLYVINYL BUTYRAL

NITRO-CELLULOSE

CELLULOSE ACETOBUTYRATE

ACRYLIC RESINS

SYNTHETIC RUBBERS

HARCHEM

HARDESTY CHEMICAL CO., INC.

41 East Forty-second St., New York 17, N.Y.

* Trade mark.

THE READER WRITES

Simulated Leather or Simulated Finish?

To the Editor of Chemical Industries:

The article in your July issue entitled "Research May Discover Better Coating Resins" is a good review.

When trying to "simulate leather", there is one question which should be considered. Are the efforts being directed toward the imitation of the leather itself or are they directed at imitation of the *finish* of the deather? Most people, when referring to leather, are thinking of the finished article, which probably is coated.

If the properties of coated (finished) leather are to be imitated, then the problem is to imitate the "brand" of the finishing material (usually based on nitrocellulose).

I offer the above merely as an interesting observation, based on experience in the manufacturing of leather finishes as well as textile coatings. Others in the field may have encountered similar ideas presented to them by coaters of textiles who are unfamiliar with the leather trades. A good definition of the finish desired seems to be the missing data needed for the development of better simulated leathrs.

ALVIN H. LIPTON, Chemist,
Hermetite Corporation,
Carlstadt, New Jersey.

Market Research Series To Be Reprinted

To the Editor of Chemical Industries:

Recently I had the pleasure of reading several of the articles in your magazine on "Information Sources for Chemical Market Research."

I found these articles to be not only interesting but of great informative value. You are to be congratulated on your fine contribution to this field, and the opportunity to read of the ideas and comments of the experienced men that you present as authors is truly appreciated.

In the October issue of 1946 I note that plans were being made to compile the complete series of these articles in booklet form. To date I have seen no further information concerning the compilation, and I am greatly interested as to the progress of these plans. I would appreciate your advising me as to the publication of this booklet and how it may be obtained.

D. J. JOYCE,
Chemical & Color Division,
Minnesota Mining & Manufacturing Co.,
St. Paul 6, Minnesota.

The article on state publications in last month's issue completed the series of data sources for chemical market research. The demand for reprints of these articles has been so great that we are rushing our plans for fall publication of the complete set of 19 articles in single booklet form. Price of the booklet will be $2.50, and we hope to have copies available by November.—EDITOR.

Emulsion Paints

To the Editor of Chemical Industries:

We are pleased to note your excellent article on Emulsion Paints in your June 1947 issue. Mr. Sutheim certainly had an excellent grasp of the subject.

We are wondering if you have any reprints of this article.

E. SCHULTE, Technical Director
Paint & Varnish Division
The Glidden Company
Cleveland, Ohio

Just a few left.—EDITOR.

Chlorine Cell Correction

In the report "Diaphragm vs. Amalgam Cells for Chlorine-Caustic Production" that appeared in the July issue the amounts of impurities in a typical purified diaphragm cell caustic (Table VIII, col. 2) were inadvertently shown as double what they should be. The correct figures for column 2 of Table VIII are as follows:

	% in Diaphragm cell caustic, purified
NaOH	50.20
Na_2CO_3	.15
Na_2SO_4	.01
NaCl	.08
$NaClO_3$	.0002
CaO	.001
MgO	.001
Al_2O_3	.0015
SiO_2	.009
NH_3	.0002
Fe	.00025
Ni	.00001
Cu	.00002
Mn	.00003
Hg	.....

This error has been corrected in the reprints of the report.

Anti-Static Correction

The article "Amine Dust Bane" on page 38 of our July issue inadvertently contained the following incorrect statement: "Oddly enough, the amine effect does not prevent the accumulation of a charge on the plastic surface, but it changes the polarity of the charge so that it is opposite to that of the dust particles." This statement should have read, ". . . so that it is the same as that of the dust particles and therefore repels them."

SODIUM ALUMINUM SILICO FLUORIDE

AMMONIUM SILICO FLUORIDE

MAGNESIUM SILICO FLUORIDE

SODIUM SILICO FLUORIDE

ZINC SILICO FLUORIDE

POTASSIUM SILICO FLUORIDE

HENRY SUNDHEIMER COMPANY

Established 1908

103 Park Ave. New York 17, N. Y.

Chrome Tanned LEATHER

Travels in the best circles!

Chrome Tannage is now used on practically all upper leather for shoes as well as about 90% of the light weight leathers. The flexibility of the Chrome Tanning Process, in addition to its economy in time and money, lends itself to the production of a variety of leathers having different characteristics. In the case of shoe and garment leathers particularly, these characteristics undergo constant adjustment to meet changing fashions. Tanners have found these changes may be accomplished more easily when the leather is Chrome tanned.

Chrome tanned leathers are also stronger. This greater strength is shown in resistance to wear and in ability to withstand the rigors of weather. They may also be made highly resistant to water without destroying their ability to "breathe." Another advantage is resistance to shrinkage at temperatures up to 212° F. This has led to a number of mechanical applications such as bellows in gas meters, packing for hydraulic rams, pump gaskets, oil seals, etc.

Mutual, the oldest bichromate manufacturer in the United States, has supplied Chrome to the tanners of this country for over a century. Our Research Department is constantly striving to improve our products, and to cooperate with our customers.

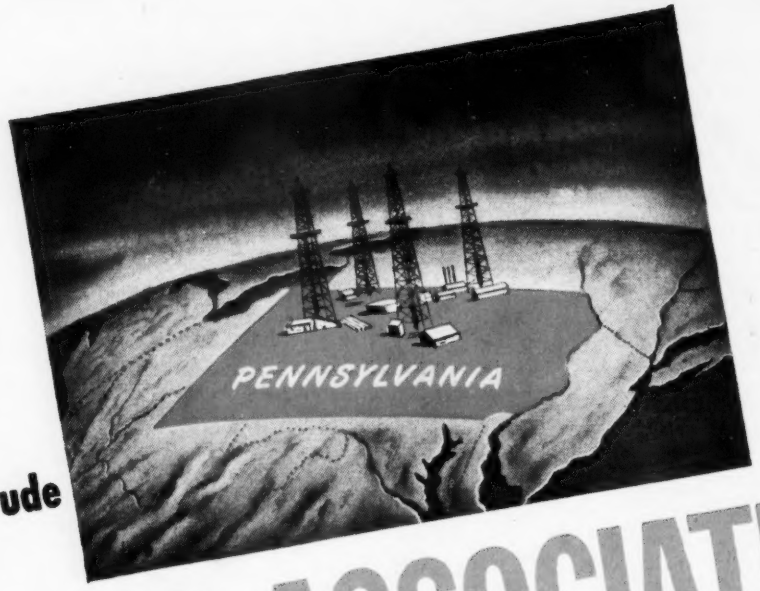
●

Bichromate of Soda • Neutral Chromate of Soda
Bichromate of Potash • Chromate of Potash
Chromic Acid

MUTUAL CHEMICAL COMPANY OF AMERICA
270 Madison Avenue, New York 16, N. Y.

MUTUAL CHEMICAL CO. OF AMERICA — MUTUAL — NEW YORK, N.Y.

Mutual
CHROMIUM CHEMICALS



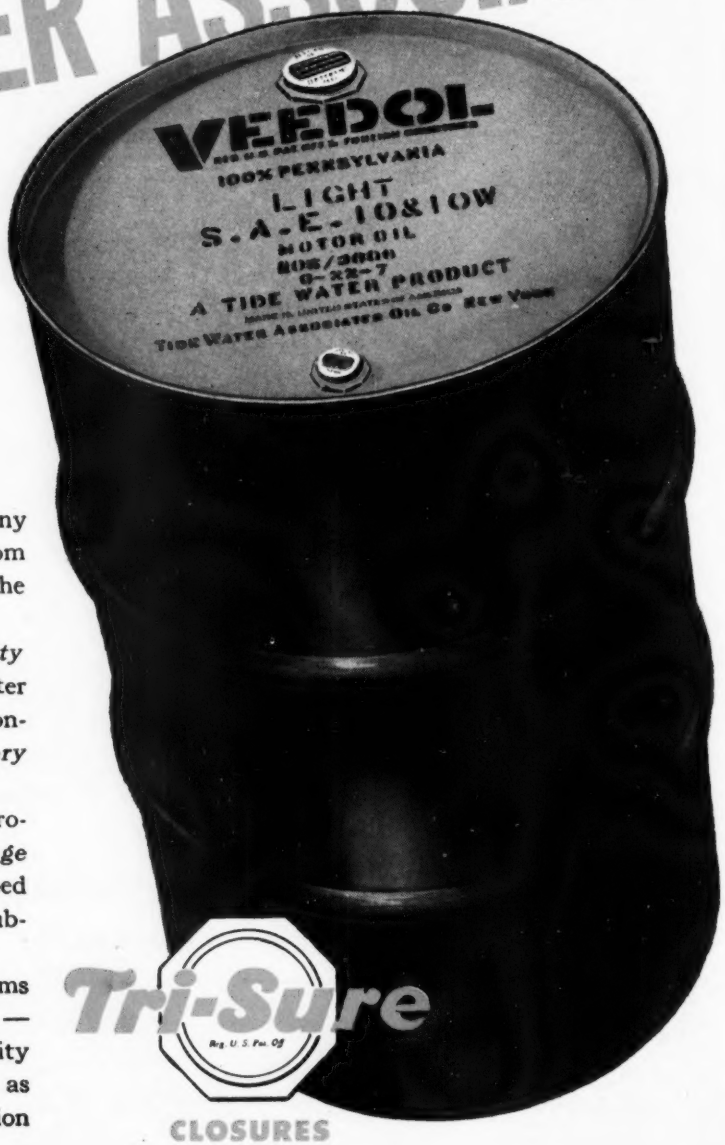
Quality

from Pennsylvania crude —the world's finest

TIDE WATER ASSOCIATED

Protection

with Tri-Sure Closures on every drum



THE Tide Water Associated Oil Company refines its famous Veedol Motor Oil from 100% Bradford Pennsylvania Crude Oil, the finest and costliest known.

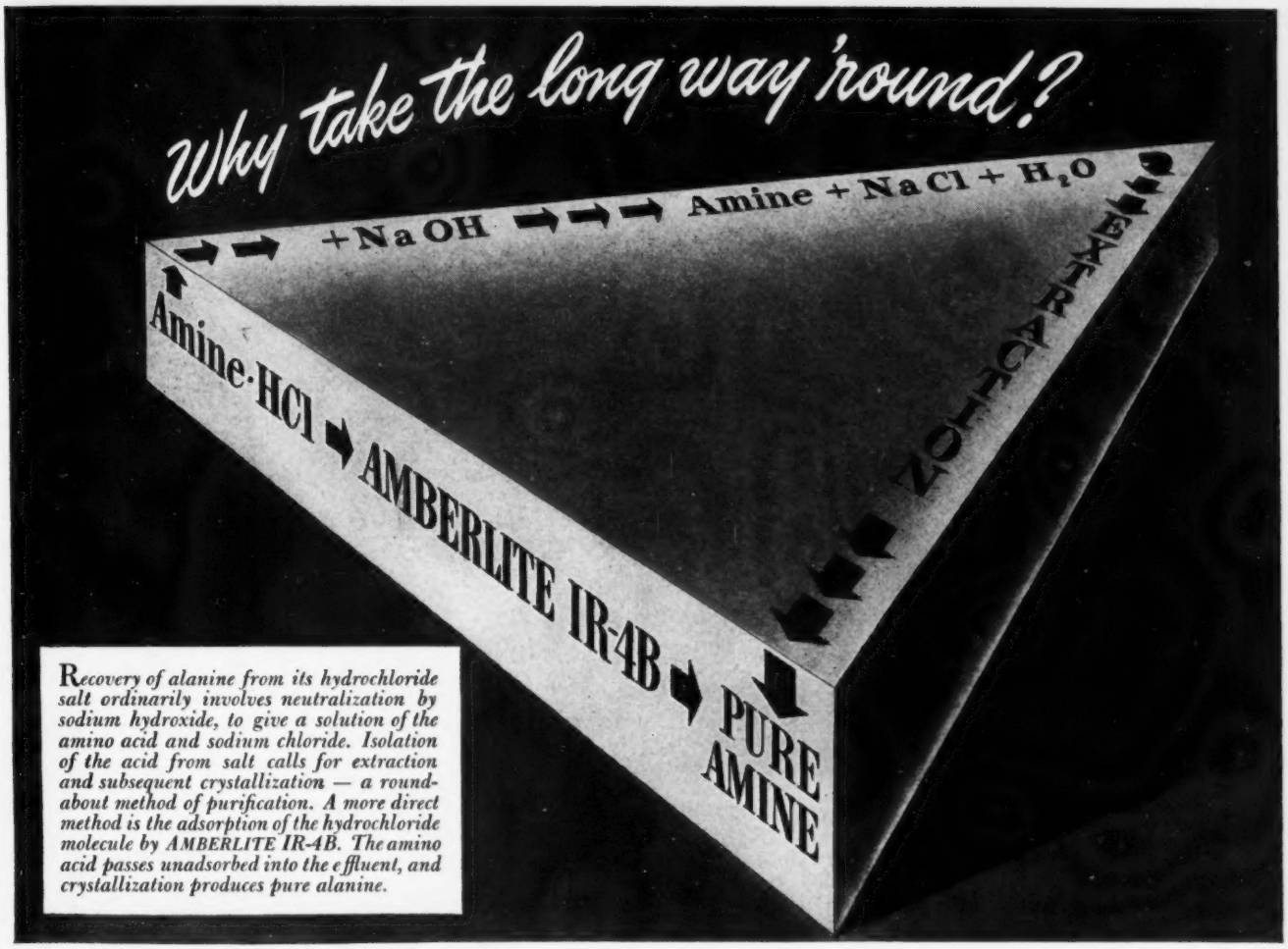
And just as Tide Water maintains *quality* by using Pennsylvania crude, Tide Water *safeguards* that quality from plant to consumer by equipping *every drum* of *every size* with Tri-Sure Closures.

Tri-Sure Closures provide the triple protection of an air-tight *seal, plug* and *flange* —the most reliable safeguard ever developed for protecting liquids from tampering, substitution, pilferage and seepage.

On Tide Water drums—and on the drums of other leading shippers of fine liquids—Tri-Sure Closures say, "Here is a quality product . . . delivered to you exactly as specified . . . in exactly the same condition in which it left the plant."

AMERICAN FLANGE & MANUFACTURING CO. INC., 30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA



Recovery of alanine from its hydrochloride salt ordinarily involves neutralization by sodium hydroxide, to give a solution of the amino acid and sodium chloride. Isolation of the acid from salt calls for extraction and subsequent crystallization — a round-about method of purification. A more direct method is the adsorption of the hydrochloride molecule by AMBERLITE IR-4B. The amino acid passes unadsorbed into the effluent, and crystallization produces pure alanine.

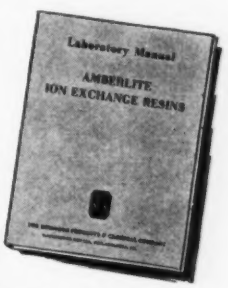
Salt conversion with Amberlite Ion Exchange Resins

The liberation of weak bases from their salts represents a new field of application for the acid-adsorbent properties of AMBERLITE IR-4B. These exchange properties, also extensively used in conjunction with the cation exchanger, AMBERLITE IR-100, produce completely deionized water comparable in purity to single distilled.

The function of AMBERLITE IR-4B in liberating weak bases results from the fact that the resin is sufficiently basic to remove acid formed by the hydrolysis of certain dissolved salts. This new concept in ion exchange technology opens interesting potentialities for the AMBERLITES.

For special chemical processes . . . for the softening or complete deionization of water . . . investigate the AMBERLITES. Our technical staff will be glad to discuss potential uses.

Handy Facts about the Amberlites



You'll find plenty of worthwhile information about the AMBERLITES in our new Laboratory Manual, which suggests many ways in which these Ion Exchange Resins can help you. Write for your copy. The Resinous Products & Chemical Company, Dept. CE-7, Washington Square, Philadelphia 5, Pa.

AMBERLITE *is a Trade-mark, Reg. U.S. Pat. Off.*

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

HAVE YOU INVESTIGATED

VINSOL

a low-cost thermoplastic resin with many uses

IF you're looking for both economy and versatility in a resin —it's Hercules Vinsol®!

Low in cost and immediately available, this resin contributes many unique properties to a wide variety of compositions. Vinsol's properties include insolubility in petroleum hydrocarbons, and incompatibility with most petroleum oils and waxes. It is soluble in alcohol, esters, cyclic hydrocarbons, and chlorinated solvents.

Vinsol is compatible with cellulose acetate, nitrocellulose, and ethyl cellulose. It may be dispersed in natural rubber and most synthetic rubbers. Compatibility with zein makes it ideal as a component of shellac substitutes. Combined with lignin, it imparts improved flow. Vinsol can be made soluble with many vegetable oils by cooking Vinsol-vegetable oil to varnish-making temperatures.

Vinsol may be saponified with sodium or potassium hydroxide to form water-soluble soaps. It may be esterified with alcohols, or condensed with formaldehyde.

This economical thermoplastic resin is available in lump, flake, and pulverized form. It is also available in emulsion form of 40 per cent solids content. For more complete technical details, or for assistance in applying Vinsol, return coupon below.

HERCULES

HERCULES POWDER COMPANY
INCORPORATED
992 Market Street, Wilmington 99, Del.

*I am interested in Vinsol Resin for:*_____

_____

*Name*_____

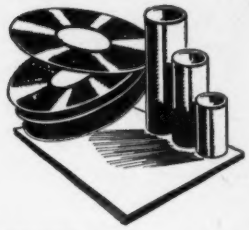
*Company*_____

*Street*_____

*City*_____ *Zone*_____ *State*_____

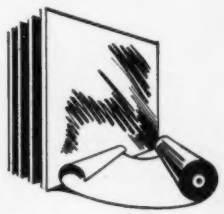
GC7-1

These and Other Industries use Vinsol Resin



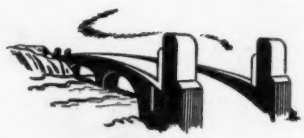
PLASTICS...

Modifier for ethyl cellulose, shellac, vinyl resins for phonograph records. Modifier and extender for phenol-aldehyde resins in molding powders, and as binders for rock wool insulation batts and laminated plastics.



PAPER...

Stiffener and modifier for heavy paper and paperboard . . . binder for lignin-like building boards made from fiber or cellulose products.



CONSTRUCTION...

Vinsol and Vinsol NVX are used as emulsifiers and stabilizers for asphalt emulsions . . . air-entraining agents for Portland cement, masonry cement.

PROTECTIVE COATINGS...

Gives spirit varnishes, from cherry to mahogany, color without the use of dyes . . . low-cost ingredient for dark-colored nitrocellulose lacquers.

ADHESIVES...

Economical ingredient for linoleum and floor tile cements . . . in grease-proof tile.

® TRADE-MARK REG. U. S. PAT. OFF.

DOUBLE CHECKED from RESEARCH to INDUSTRY

SHARSOL

FOR SOLUBILIZING 2,4-D

SHARSOL 221, a mixture of monoethylamine and triethylamine, makes possible the preparation of 2,4-D solutions of 40% strength. This solubilizing agent is economical to use and is readily available in drums or tank cars.

SHARSOL 193, triethylamine, appears to be an outstanding solubilizer for 2,4-D where the following characteristics are desired:

1) Approximately 60% 2,4-D (even below 32°F.)
2) Low freezing point (no anti-freeze agents needed)
3) Relatively low viscosity

When Sharsol 193 is used, the heat of reaction is such that steam need not be used in preparing the solution. Sharsol 193 is available in drums or tank cars.

Samples and further information are available

SHARPLES TRADE MARK CHEMICALS

SHARPLES CHEMICALS INC.

PHILADELPHIA CHICAGO NEW YORK

SHARPLES SYNTHETIC ORGANIC CHEMICALS

PENTASOL* (AMYL ALCOHOLS) BURAMINE* (BUTYL UREA, Tech.)
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PENT-ACETATE* (AMYL ACETATE) PENTAPHEN* (p-tert-AMYLPHENOL)
PENTALARM* (AMYL MERCAPTAN) VULTACS* (ALKYL PHENOL SULFIDES)
PENTALENES* (AMYL NAPHTHALENES)

AMYLAMINE ETHYLAMINE BUTYLAMINE
DIAMYLAMINE DIETHYLAMINE DIBUTYLAMINE
TRIAMYLAMINE TRIETHYLAMINE TRIBUTYLAMINE
DIETHYLAMINOETHANOL TETRAETHYLTHIURAM DISULFIDE
ETHYLETHANOLAMINES 161 TETRAETHYLTHIURAM MONOSULFIDE
DI-sec-AMYLPHENOL TETRAMETHYLTHIURAM DISULFIDE
ZINC DIETHYLDITHIOCARBAMATE
ZINC DIMETHYLDITHIOCARBAMATE
ZINC DIBUTYLDITHIOCARBAMATE
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AMYL CHLORIDES o-tert-AMYLPHENOL o-sec-AMYLPHENOL
DICHLORO PENTANES DI-tert-AMYLPHENOL AMYL SULFIDE
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PLANT: WYANDOTTE, MICH.

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Canada: SHAWINIGAN CHEMICALS LTD., Montreal, Quebec . . Toronto, Ontario
Export: AIRCO EXPORT CORP., New York City

NEUTRONYX 330

SUGGESTED USES

EMULSIFYING AGENT in manufacture of cosmetics, industrial cleaners, insecticides, and for the production of emulsifiable oils. Degreasing and fat liquoring in leather making.

•

SEQUESTERING AGENT in manufacture of foam rubber.

•

DISPERSING AGENT in making DDT dispersions. Particularly useful in dispersing heavy metal soaps and the insoluble complexes formed when anionic and cationic surface-active agents are mixed.

•

DETERGENT, particularly in salt and hard waters. Used in organic solvents for removal of residual oils in cleaning airplane, automotive and other metal parts. Also used as a foaming and coupling agent.

PROPERTIES

Neutronyx 330 is a reddish brown oily liquid readily miscible with water and with alcohol. It contains an anhydrous polyalkyl ether condensate of fatty acids.

It is compatible with moderate concentrations of acids and alkalies and with hard water, electrolytes and both anionic and cationic surface-active agents. It disperses insoluble anionic-cationic complexes. Soluble in both water and organic solvents.

It is stable to heat and has perfect stability in both normal plant use and in storage.

PERFORMANCE

Surface Tension (Dynes per Cm.)
DuNouy Tensiometer (25°C.)

Concentration	Dynes
0.5%	34.5
0.1%	35.2
0.01%	35.4

Wetting Action (Draves Test)

Concentration	25°C.	60°C.
0.5%	215 Sec.	27 Sec.
0.2%	5 Min. Plus	56 Sec.
0.05%	"	170 Sec.

Detergency

Hunter Reflectometer with standard soiled cotton before and after washing.

Concentration	Per Cent
0.1%	13.5
0.05%	11.9
With addition of 0.25% TSPP	
0.1%	22.8
0.05%	15.0

Non-Ionic Surface-Active DETERGENT AND EMULSIFIER

With Unusual Dispersing Action

NEUTRONYX 330 is a typical example of the Neutronyx Series of non-ionic surface-active agents. The Series includes five materials, all with exceptional usefulness in detergent, emulsifying and dispersing action with the outstanding advantage of stability against hardness, electrolytes and both anionic and cationic surface-active agents. Each of these materials possesses unique combinations of surface-active characteristics, so that for a given application it is desirable to evaluate each one in order to determine the best balance of properties for a specific application. Each Neutronyx material is an excellent wetting agent in warm solutions.

We will gladly send samples for laboratory or plant test.

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THE THOUSANDS OF CARS on the nation's highways will last longer . . . require less "upkeep" . . . thanks to recent advances in the science of lubricating oil additives that protect motors by inhibiting corrosion and oxidation and increasing detergency. An established leader in the field, Cyanamid's most recent contribution is the development of AEROLUBE* Additives, for premium grade motor oils. Technical bulletins on AEROLUBE Additives and other types of additives are available from the Petroleum Chemicals Department.

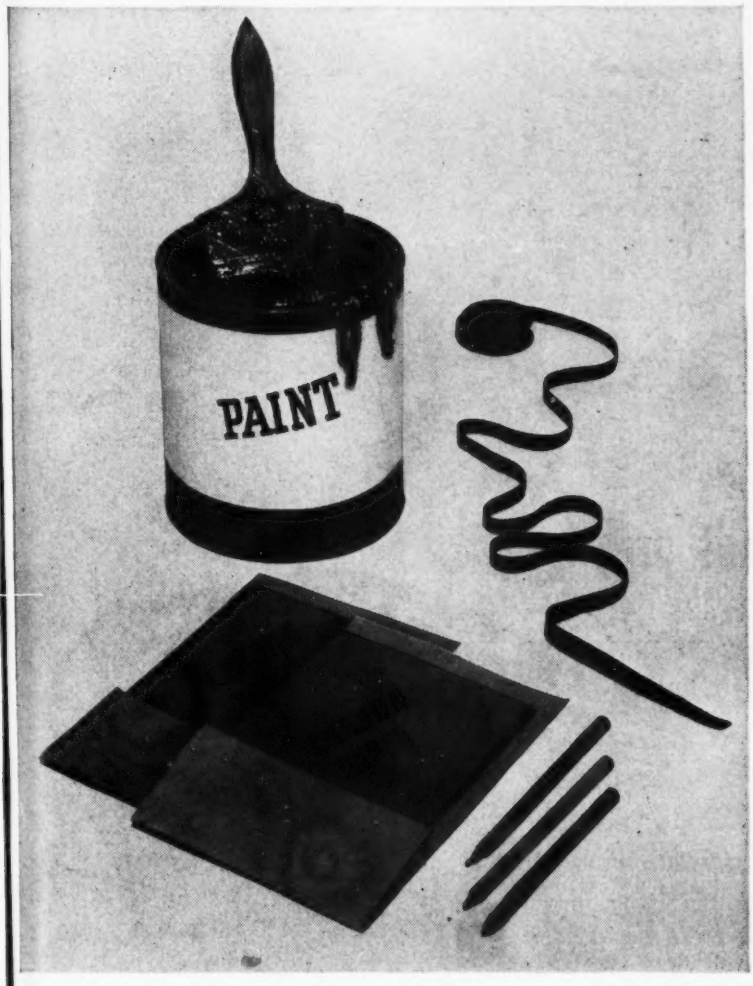
DURABILITY AND TOUGHNESS . . . essential qualities in modern surface coatings . . . are produced by Cyanamid's REZYL* Resins. These famous alkyd type resins have other good features . . . fast drying, high gloss, good color retention and excellent adhesion. Applications range from bikes and busses to the trim around the door or the refrigerator in the kitchen.

*Reg. U. S. Pat. Off.

CUTTING WATER TREATMENT COSTS FROM $50 TO 50¢ A DAY is one example of water demineralizing economy when using Filt-R-Stil* Demineralizers. This new book describing the most modern and economical way to a readily accessible supply of mineral-free water may help you answer your water "problem." It is yours, without obligation, by writing Ion Exchange Products Department, American Cyanamid Company.

Chemical Newsfront

IRON BLUE AND CHROME GREEN PIGMENTS made with Cyanamid's AERO** Brand Yellow Prussiate of Soda and Yellow Prussiate of Potash are known throughout the dry color industry. These pigments are used in the manufacture of high-quality floor coverings, paints, lacquers, enamels, printing inks, typewriter ribbons, carbon paper, crayons. These prussiates find wide and important use, too, in printing aniline blacks on cotton and rayon, and in the coating of speed blueprint paper.



PLIABILITY AND WATER RESISTANCE are two qualities of paper that are much improved by adding Cyanamid's ALWAX** Sizes. Products ranging from note paper to milk bottle hoods benefit by as little as one to two-tenths of one per cent of ALWAX Sizes. Paper is less likely to crack and break due to loss in moisture content. This is particularly important where indoor humidities are low . . . and superior folding, creasing, scoring and crimping qualities are desired. Vastly increased, too, is the paper's resistance to penetration by water, printing inks and other organic liquids. ALWAX Sizes are one of many Cyanamid chemicals designed to solve a wide range of paper and packaging problems. **Trade-mark

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Industrial Chemicals Division

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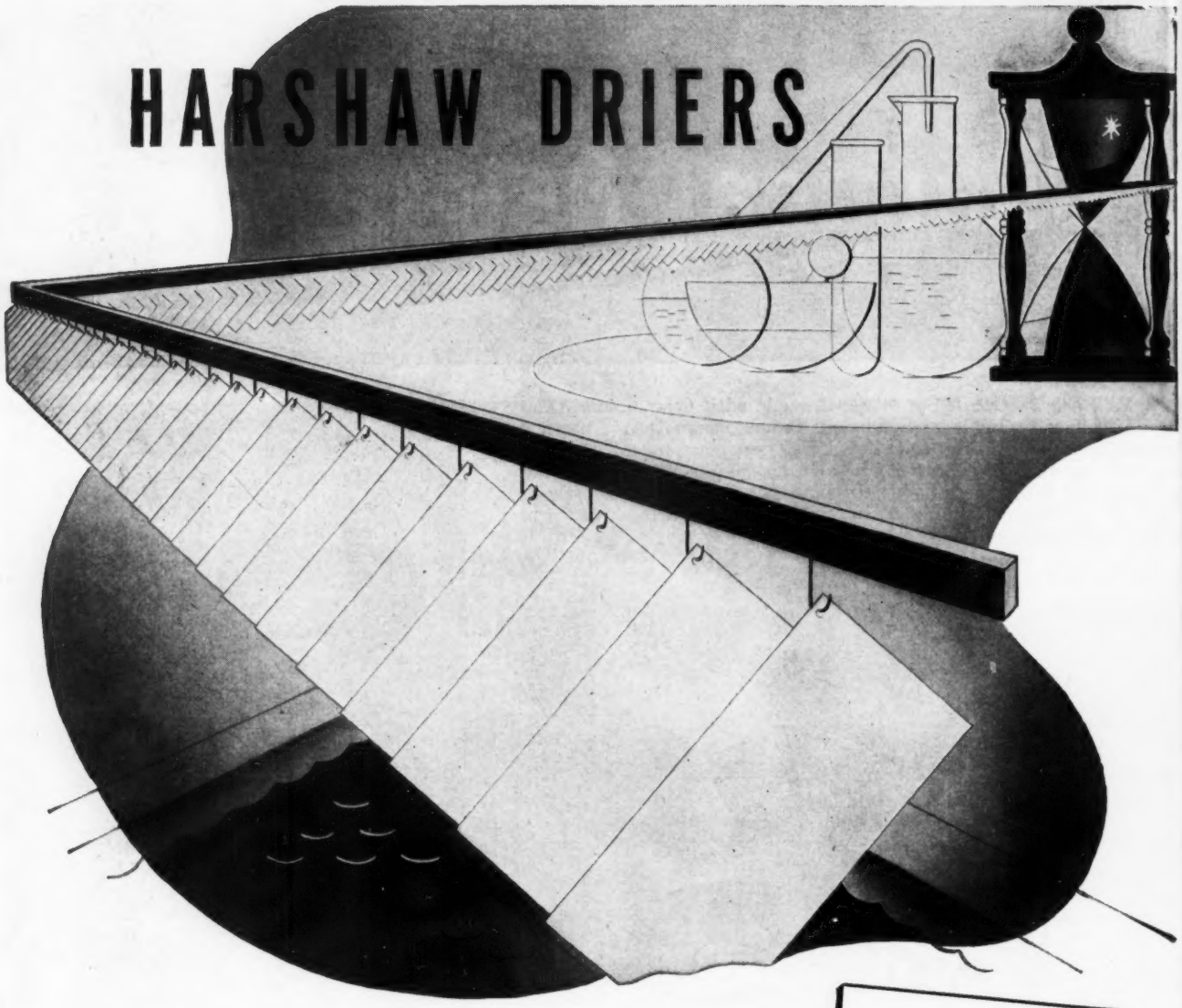

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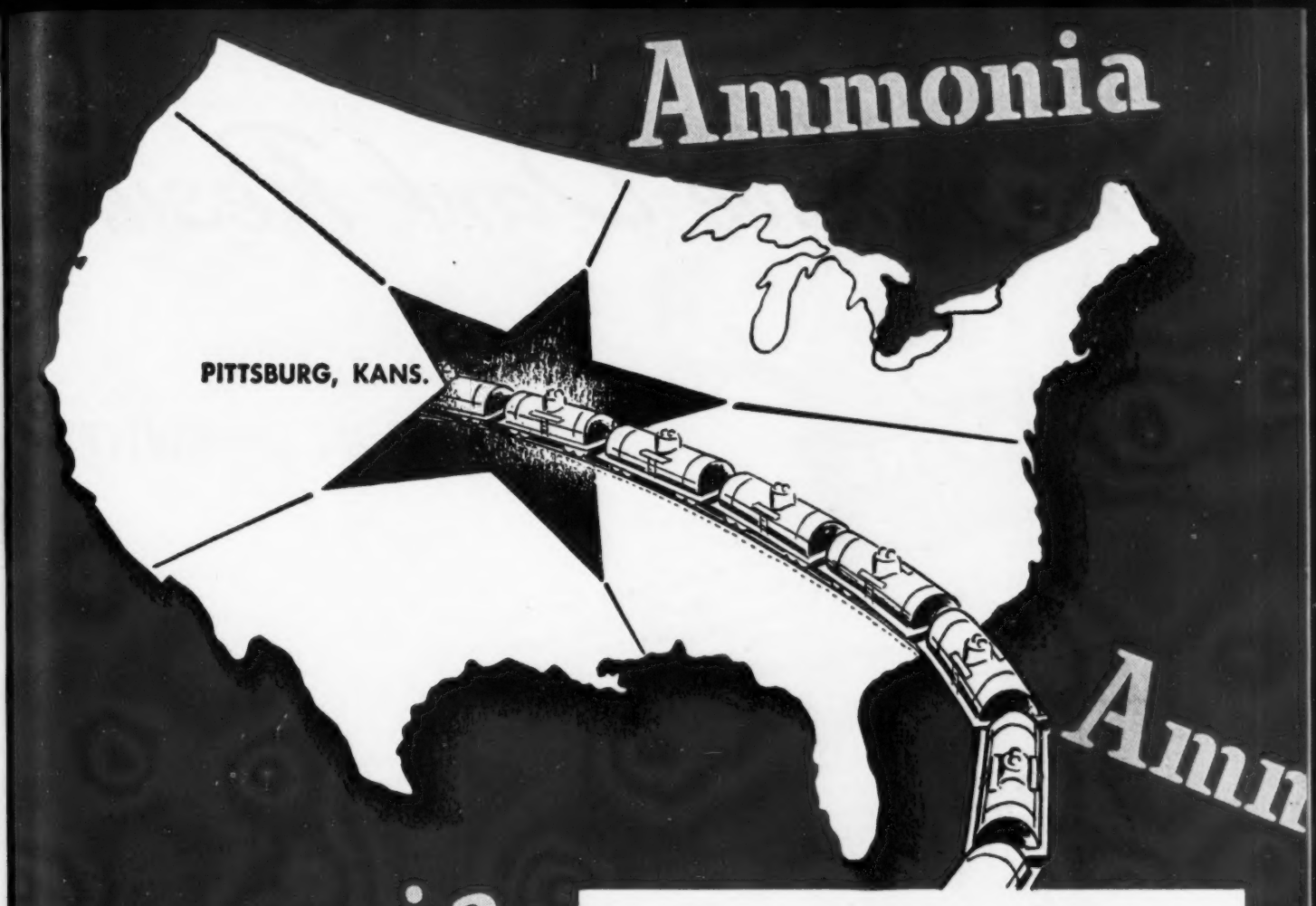

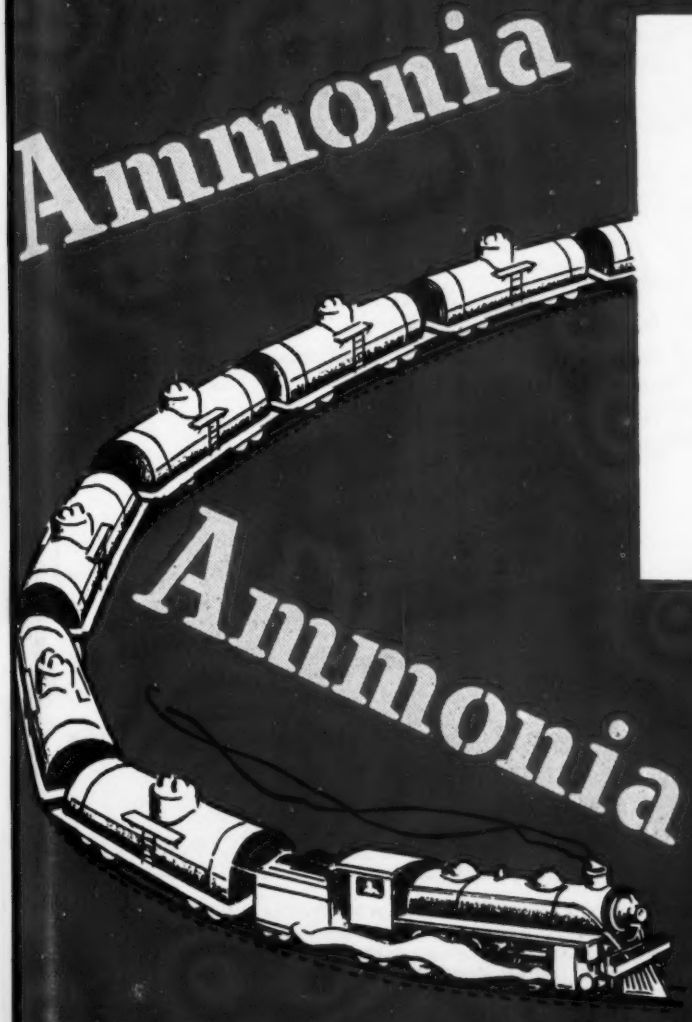

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Used in the manufacture of adhesives, box toes, ethyl cellulose lacquers, impregnations, linoleum, floor tile, sealing compounds, varnishes and in the compounding of natural and synthetic rubber.

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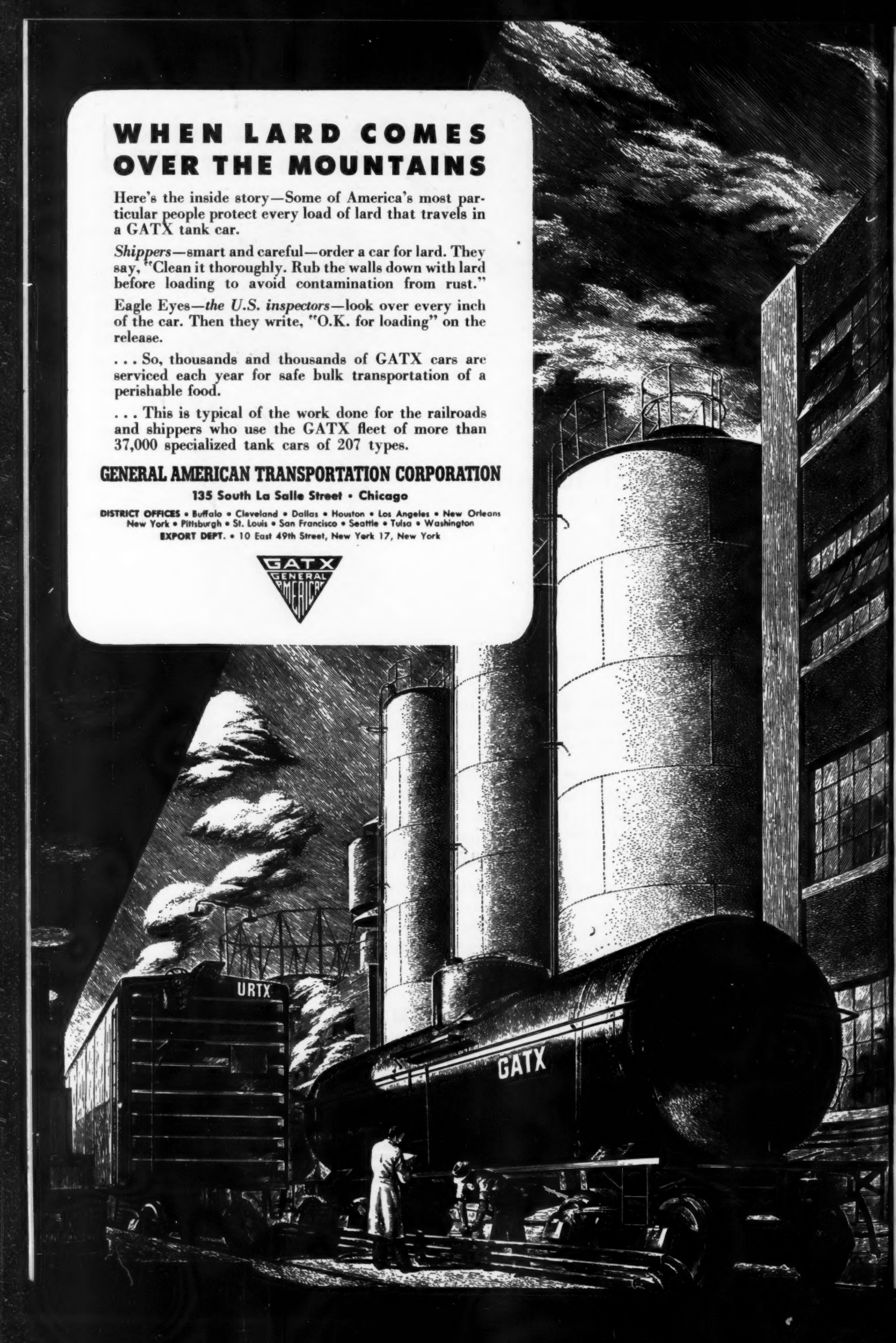

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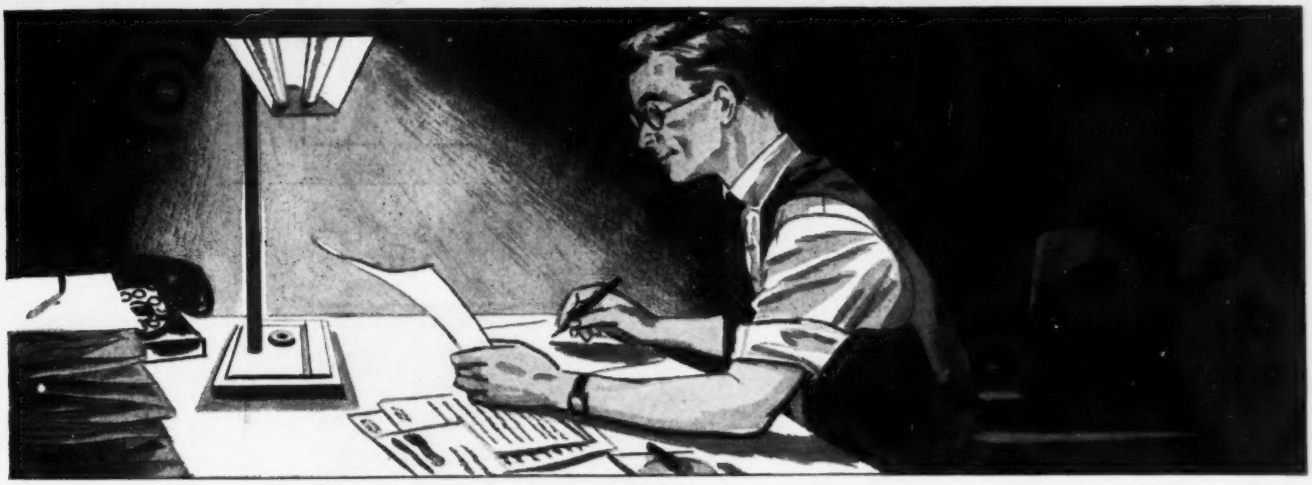

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In all cleansing, scouring and washing operations, Santomerse No. 1 — is immediately active in penetrating and loosening soil deposits. As these deposits are freed, they are maintained in suspension, so that subsequent action and rinsing remove soil without redeposition. This multiple detergent action is only one of the many properties of Santomerse No. 1 that makes it the truly modern, all-purpose synthetic detergent and wetting agent.

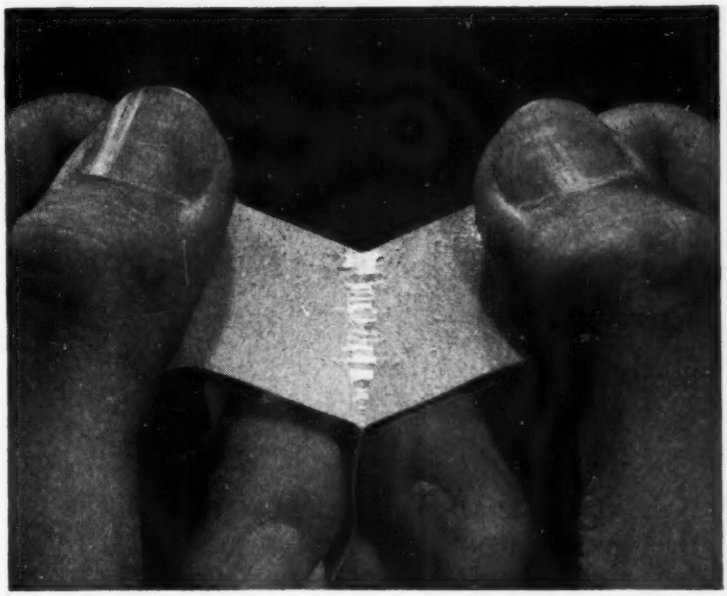
A prominent characteristic of Santomerse No. 1 is its detersive action in extremely hard water. It is outstandingly effective at any pH in hot or cold solutions.

The washing, wetting, dispersing and emulsifying properties of Santomerse No. 1 — and their superiorities in industrial and household applications — are fully discussed in Monsanto's new Application Data Bulletin No. P-118. Send for your copy — also request additional copies for others in your organization who may be interested . . . Contact the nearest Monsanto District Sales Office, or write to MONSANTO CHEMICAL COMPANY, Phosphate Division, 1703 South Second Street, St. Louis 4, Missouri.

Santomerse: Reg. U. S. Pat. Off.

Check list of a few applications of Santomerse No. 1

- Fruit and vegetable washing
- Automobile cleaning
- Dairy equipment cleaning
- Dishwashing
- Dry cleaning
- Glass cleaning
- Household cleaners
- Commercial laundries
- Household laundries
- Milk bottle cleaning
- Painted surface cleaning
- Railroad car cleaning
- Rug cleaner
- Wall cleaner
- Bubble bath preparations
- Fur processing
- Leather processing
- Metal cleaning
- Cold water paint manufacture
- Paper manufacture
- Paper stock de-inking
- Cotton dyeing, bleaching and finishing
- Rayon dyeing, bleaching and finishing
- Silk dyeing, bleaching and finishing
- Nylon dyeing, bleaching and finishing
- Jute, straw, hair and feather processing
- Wool processing
- Wallpaper remover



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If you are looking for plasticizers to increase the adhesion of your coating or to make adhesives of the solvent or heat-sealing type, you should consider Monsanto's sulfonamide plasticizers and resins. They offer improved adhesion in combination with a large variety of resins. In addition, they give excellent plasticizing value.

One of the unique properties of these sulfonamids is their compatibility with thermo-setting resins. In addition, they are compatible with proteins such as casein, zein, soybean protein, hide and bone glue — synthetic rubbers such as butadiene and acrylo nitrile — cellulose derivatives, polyvinyl acetate and polyamids.

While some Monsanto plasticizers are not yet commercially plentiful, others are becoming more available. In any case, it is quite possible that Monsanto can offer valuable suggestions on different phases of your present or contemplated plasticizer and resin applications. Contact the nearest Monsanto Office, or address Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, 1703 South Second Street, St. Louis 4, Missouri.

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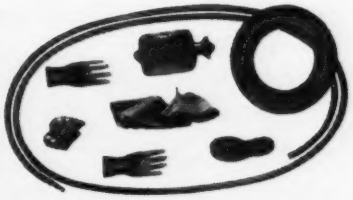

Monsanto Rubber Chemicals

At Akron, Ohio, Monsanto maintains its Rubber Service Laboratories, the scene of continuing experiments to determine improved techniques for the application of the following Monsanto chemicals widely used in natural, synthetic and reclaimed rubber stocks:

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- El-Sixty*
- Ureka*
- Ureka C
- Ureka Blend B
- Thiotax (2-Mercapto benzo thiazole)
- Thiofide* (2,2' dithio-bis benzo thiazole)
- A-10
- A-19*
- A-32
- A-77*
- A-100
- Diphenylguanidine (D.P.G.)
- Guantal*
- R-2 crystals
- Pip-Pip
- Thurad* (Tetra methyl thiuram disulfide)
- Ethyl Thiurad (Tetra ethyl thiuram disulfide)
- Mono Thiurad* (Tetra methyl thiuram mono sulfide)
- Methasan* (Zinc salt of dimethyl dithiocarbamic acid)
- Ethasan* (Zinc salt of diethyl dithiocarbamic acid)
- Butasan* (Zinc salt of dibutyl dithiocarbamic acid)

ANTIOXIDANTS
- Flectol* H
- Santoflex* B
- Santoflex BX
- Perflectol*
- Santowhite*
- Santovar* A

MISCELLANEOUS MATERIALS
- Thiocarbanilide ("A-1")
- Insoluble Sulfur "60"

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For complete information on any of these Monsanto products, or experienced assistance in your particular rubber chemical problems, address: MONSANTO CHEMICAL COMPANY, Rubber Service Dept., Second National Bldg., Akron 8, Ohio.

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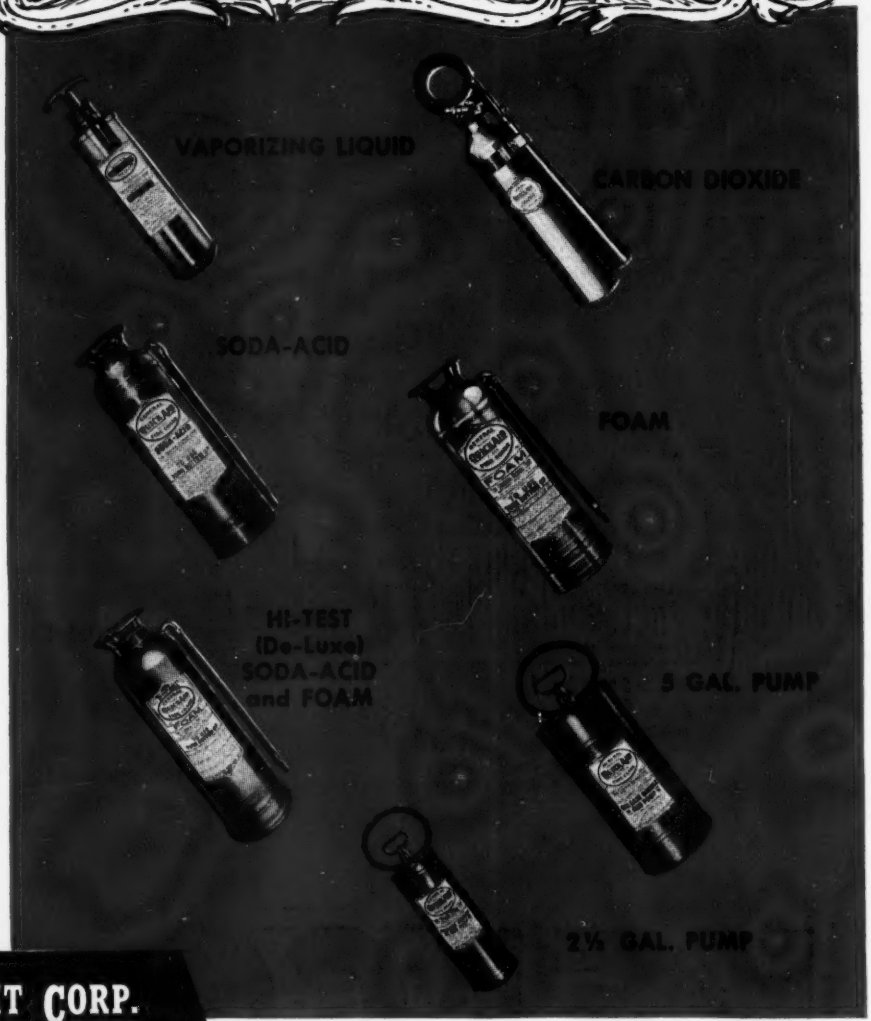

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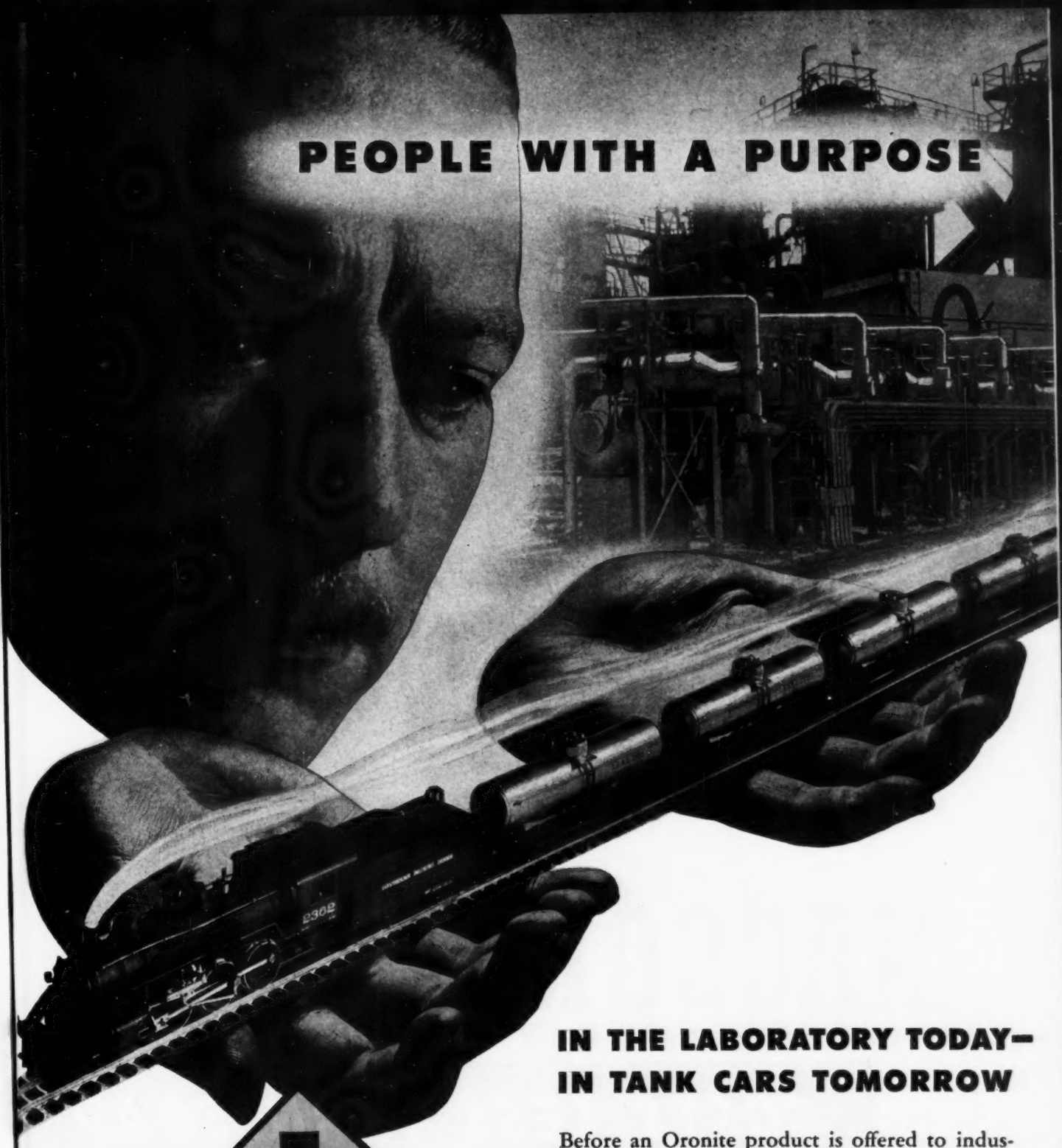

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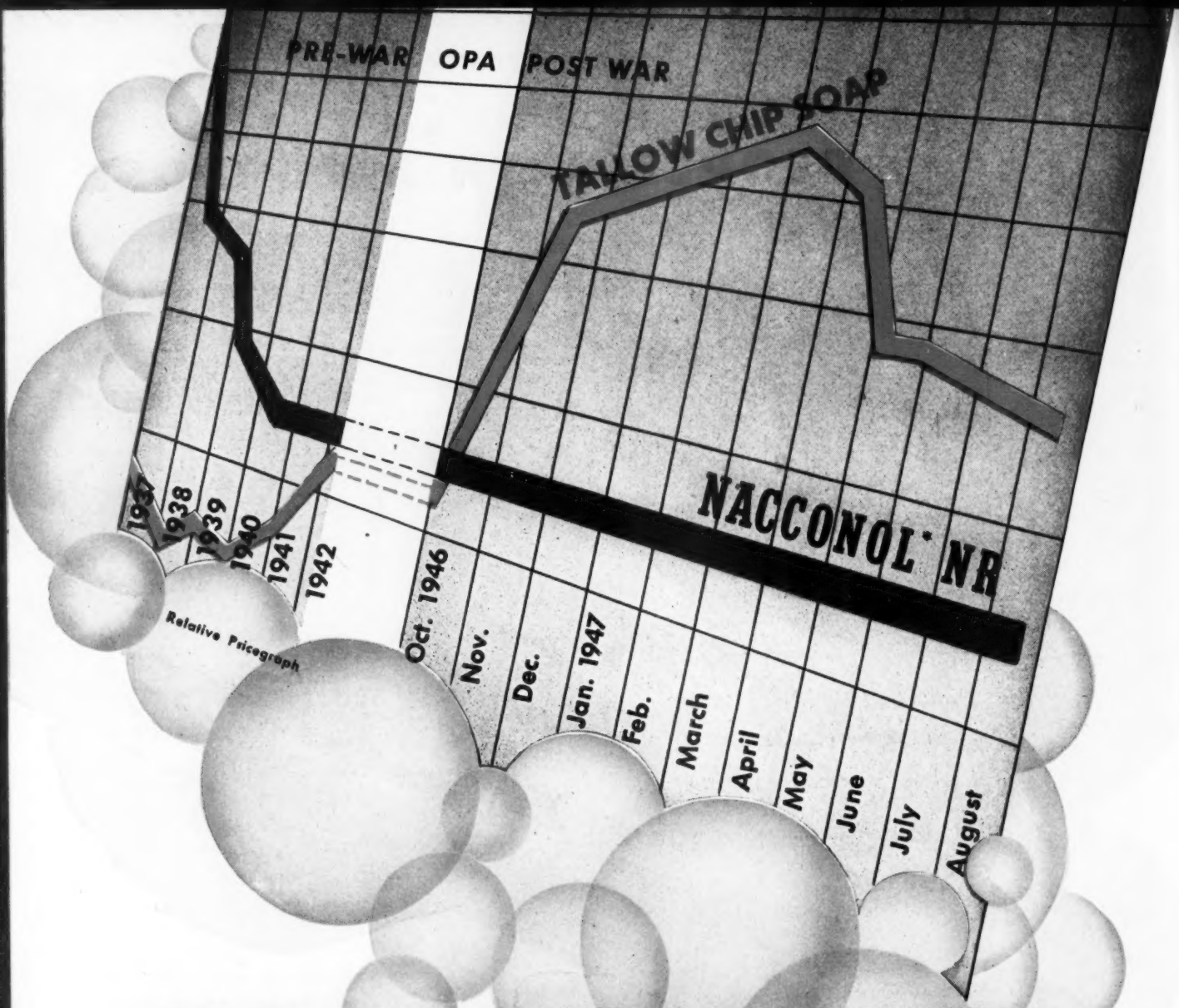

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U.S.I. CHEMICAL NEWS

September ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1947

USI CONTRACTS FOR TOTAL CHEMICAL OUTPUT OF FIRST FISCHER-TROPSCH PLANTS

Large Quantities of Alcohols, Ketones, Acids, Aldehydes And Esters Will Benefit the Entire Chemical Industry

An event of the utmost importance to all chemical consuming industries was the recent announcement of a long-term contract between Stanolind Oil & Gas Company and U. S. Industrial Chemicals, Inc., for the sale of all of the water soluble oxygenated chemicals that will be produced at the first two synthetic gasoline and oil plants using the much publicized Fischer-Tropsch process. The plants are being undertaken by the Stanolind Oil & Gas Company (subsidiary of the Standard Oil Co. of Indiana) and Carthage Hydrocol Corporation. The plans also call for the erection of U.S.I. plants at the two locations for the production of other products using some of the Fischer-Tropsch chemicals as raw materials.

Expect at Least 300,000,000 Pounds of Chemicals Annually

It is estimated that the chemicals produced from these Fischer-Tropsch plants may exceed a total of 300,000,000 pounds annually, and include ethyl alcohol, methyl alcohol, normal propyl alcohol, normal butyl alcohol, normal amyl alcohol, acetone, methyl ethyl ketone, acetic acid, propionic acid, butyric acid, acetaldehyde, propionaldehyde and butyraldehyde. In addition, U.S.I. will produce esters, higher alcohols and other chemicals from some of the primary products which will add substantially to the number of products made available by this development.

The effect on the chemical industry of large quantities of these important organic chemicals from this new basic process is obvious.

It will mean a dependable new source of much needed chemicals at prices competitive with those from any other synthetic or fermentation process. It will open up new fields by making available for the first time, large quantities of such products as normal propyl alcohol, normal amyl alcohol, propionic acid, and butyric acid and it will stimulate development of new solvents, plasticizers, pharmaceuticals, plastics and a host of other chemical products.

It is important to note that all of the alcohols, acids, ketones and aldehydes produced by this process are the normal compounds. These normal compounds are generally preferred but heretofore only the lower members of the series have been available in quantity at reasonable prices.

A 'Natural' for U.S.I.

U.S.I. is in a particularly favorable position to handle these products from the Fischer-Tropsch process. With its many years of experience in serving the industries using these chemicals, its strategically located, nation-wide distribution facilities, its highly trained technical personnel and well developed production techniques, it will offer very valuable service to all users.

Important contributions will also be made by the use of processes developed by U.S.I. for the conversion of some of the primary products into other chemicals.

During the time the plants are being completed, which it is estimated will be approximately two years, U.S.I. will supply all possible technical assistance to users of these chemicals, particularly the new products, so that adequate data will be obtained in sufficient time to take full advantage of their availability.

ADVERTISEMENT—*This entire page is a paid advertisement*

September ★ **U.S.I. CHEMICAL NEWS** ★ 1947

High-Purity Caustic Made By New-Type Mercury Cell

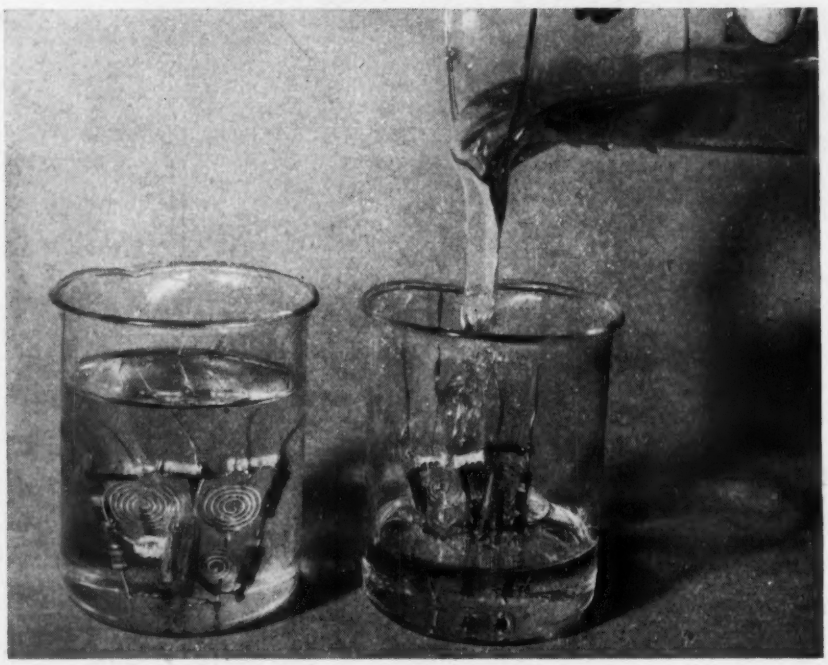
A stationary mercury cell which produces caustic soda of high purity and offers certain operating economies is now ready for licensing, it was announced recently. High-purity caustic is essential to the manufacture of rayon.

The new apparatus is said to produce 50 per cent liquor directly at the cell, a much more concentrated solution than is ordinarily obtained.

Develops Rapid Method For Water Assay of Paints

An accurate, speedy method for determining the volume of water in paints and varnishes has been announced by a government bureau. The method, said to require only small samples, is claimed to determine water content to a tenth of one percent within one hour. It may also be used for water determination in oils, fats, waxes, glues, plasticizers, paper, dry foods, and many other substances, according to government scientists.

ELECTRONIC CIRCUITS "POTTED" BY NEW RESIN



Electronic circuits or even complete plug-in sub-assemblies may be easily embedded or "potted" in a new casting resin developed recently. To "pot" an electronic circuit, it is only necessary to pour the resin into a suitable mold, and then "cure" for a few days until it has solidified.

The resin is said to provide excellent electrical insulation as well as protection against rough handling and deteriorating atmospheric conditions. It should be especially useful in high-impedance control devices in heavy industry to provide adequate protection against vibration, acid fumes, high humidity, and salt spray.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

To provide termite- and rot-protection, a new product has been marketed which is claimed to protect any wood which comes in contact with the soil. A quart of the preservative is said to cover about 200 square feet of wood surface. **(No. 234)**

USI

To mark glass, cellophane, metal and wood, a new pencil has been developed which is stated to dry instantly. **(No. 235)**

USI

A new inorganic plastic, is said to be unaffected by oil, sunlight, alkali, age, and temperature up to 900 degrees F. The makers claim it is useful in molding articles for the electrical, architectural, general industrial, and consumer goods fields. **(No. 236)**

USI

A new high-speed mill, designed for grinding, emulsifying, homogenizing, mixing, dispersing, disintegrating, and many other uses, is now available. Made of stainless steel, it is said to be useful in the processing of foods, corrosive chemicals, and other materials. **(No. 237)**

USI

To secure labels permanently, a new bottle-labeling adhesive has been developed which is claimed to be highly resistant to water and humidity. **(No. 238)**

USI

A new principle of color-matching panels has been developed which is said to compensate for the error caused by the fact that in most people the right eye is stronger than the left which makes panels on the right seem deeper and darker. **(No. 239)**

USI

A new gum from South America is announced which is designed to increase the bulk of liquid arabic gum glue. **(No. 240)**

USI

A new cure for motion sickness, described as a mixture of three drugs, allays the apprehension and excitement which contribute to sea and air sickness, the makers state. **(No. 241)**

USI

A new temperature measuring system, for measurement and control of gas temperature up to 5,000 degrees Reamur, has been announced. It is said to be accurate to ± 1 per cent to 2,500 degrees R., and ± 2 per cent from 2,500 to 5,000 degrees R. **(No. 242)**

USI

Unusual fatty acids form a sweet-odored, pasty, pale cream compound, suitable for creme shampoos and other products in the sanitary chemicals field. **(No. 243)**

USI

A waterproofing membrane, consisting of an open-mesh fabric, can be used on roofing applications and many waterproofing operations in the construction industry. **(No. 244)**

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PHTHALIC ESTERS
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate

OTHER ESTERS
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Diethyl Carbonate
Ethyl Chloroformate
Ethyl Formate

INTERMEDIATES
Acetoacetanilide
Acetoacet-ortho-anisidide
Acetoacet-ortho-chloranilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloranilide
Alpha-acetylbutyrolactone
5-Chloro-2-pentanone
5-Diethylamino-2-pentanone
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Alpha-Oxalpropionate
Ethyl Sodium Oxalacetate
Methyl Cyclopropyl Ketone

ETHERS
Ethyl Ether
Ethyl Ether Absolute—A.C.S.

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Riboflavin Concentrates
*Vacatone 40
*Curbay B-G *Curbay Special Liquid

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Ester Gums—all types
Congo Gums—raw, fused & esterified
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*Arotene—pure phenolics
*Arochem—modified types
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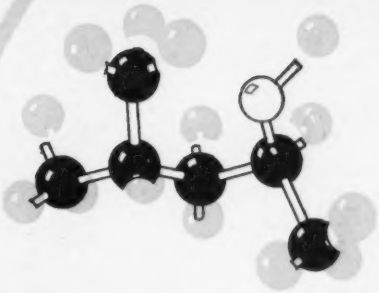
From SHELL CHEMICAL

METHYL ISOBUTYL CARBINOL

(Methyl Amyl Alcohol)



A colorless stable alcohol with a pleasant odor. Available in tank cars and drums

SPECIFICATIONS	
Purity	Min. 97.5% by wt.
Spec. Grav. 20°/20° C	0.807-0.809
Color	Max. 15 plat. cobalt (Hazen) standard
Water	Miscible without turbidity with 19 volumes of 60° Bé gasoline at 20° C
Acidity (other than carbon dioxide)	Max. .005% by wt. calculated as acetic acid
Distillation Range	Below 130° C: None Above 133° C: None

A request on your business letterhead will bring further technical information on Methyl Isobutyl Carbinol.

Among the many other Shell Chemical products are: Acetone, Methyl Isobutyl Ketone, Methyl Ethyl Ketone, Cyclohexane and Acrolein.

Here is a newly-developed solvent that can help *improve* surface coating formulations.

For example, high-purity MIBC is already contributing to better surface coatings manufactured by leading producers of industrial finishes:

Manufacturers of *nitrocellulose lacquers* find that MIBC improves diluent tolerance, viscosity characteristics, blush resistance and film flow.

In the formulation of *synthetic baking finishes* of the phenolic, alkyd or urea-melamine type, incorporation of MIBC yields solutions of low viscosity — promotes flow-out and prevents bubbling during baking operations.

OTHER IMPORTANT USERS OF **MIBC** INCLUDE:

THE MINING INDUSTRY: In conjunction with other frothing agents, MIBC improves metallurgical yields and renders recovery from low-grade ores by flotation processes more economical.

THE CHEMICAL INDUSTRIES: Undergoing the reactions typical of a secondary alcohol, MIBC is a raw material for the manufacture of resins, plasticizers, detergents, lubricating oil additives and xanthates as collectors in ore flotation.

MANUFACTURERS OF BRAKE FLUIDS AND CLEANING COMPOUNDS: Its solvent power for a wide variety of materials has established MIBC as a desirable medium-boiling constituent of solvent formulations.

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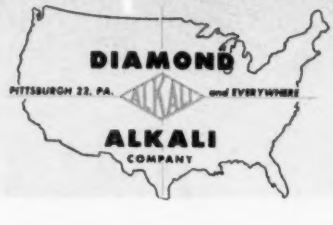


Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

For Your Information:

Newsletter
September 1, 1947

Highlighting a trend toward self-sufficiency in the resin industry, Monsanto Chemical Co. will begin construction of a formaldehyde unit at Springfield, Mass. later this month. Scheduled for completion in the second quarter of next year, it will provide -- coupled with existing phenol and wood flour facilities -- integrated production of phenol and melamine resins. Incidentally, one of the other major resin manufacturers, Reichhold Chemicals, Inc., also eyeing formaldehyde production possibilities, has postponed its plans for the nonce because of high construction costs.

* * * * *

The Texas Co., which has been busy laboratory-evaluating a number of thiophene derivatives, will soon begin to check the commercial promise of several such compounds -- including benzothiophene. Although the deal has not been finalized it is probable that these new chemicals will be introduced by the Texas Co. affiliate, Jefferson Chemical Co.

Attracting attention are reports that Carbide and Carbon Chemicals Corp. is pursuing experiments in the underground gasification of coal at Charleston, W. Va., and that these have progressed beyond the stage reached by the much-publicized Alabama Power Co. and Bureau of Mines project at Gorgas, Ala.. Recently Carbide purchased 30,000 acres of coal land in the Charleston area.

* * * * *

Among the new chemicals you will hear more about is Shell Chemical Co.'s di-tertiary butyl peroxide. It will be placed on the market within a month, will be sold mainly as a polymerization catalyst (akin to benzoyl peroxide, etc.). Also on the docket for early next year is expanded production of 2,6-tertiary butyl paracresol. Hitherto sold mainly as a lube additive (by three producers) Shell is expecting to exploit "new uses". Alkyl benzenes are also slated to receive more attention from Shell, with plans being drafted for the marketing of these compounds next January.

Hydrocarbon Research, Inc. is quietly studying processes for the production of ammonia from natural gas, and acetylene by hydrocarbon cracking. Also interested, and independently investigating acetylene manufacture, M. W. Kellogg Co.

Wyandotte Chemicals, with its new glycol unit nearing completion, has made a deal with Commercial Solvents Corp. whereby the latter company will distribute the Wyandotte glycol for antifreeze purposes. Sales for industrial uses will be handled

by Wyandotte direct. Incidentally, Wyandotte has also sold all formula, manufacturing and distributing rights to Wyandot cleanser, the household kitchen cleanser that has long been marketed by its J. B. Ford Division, to Dozier-Pond Co., merchandise brokers, Detroit. The Dozier-Pond organization will have the specialty packed by Wilbert Products Co., Inc., New York.

* * * * *

General Foods, which had a novel aerosol insecticide bomb designed and ready to place on the market, has cancelled its plans in that direction, feels that its merchandising set-up does not lend itself to effective insecticide promotion. Now being considered are additions to the company's line of specialties sold through food stores (LaFrance bluing, Satina laundry aid). One being weighed: a textile water-repellent.

In the near future Godchaux Sugar Co. will begin recovery of aconitic acid from sugar cane. Main prospective uses: preparation of surface active agents and alkyd resins.

* * * * *

Here's the story on rumors re imminent large-scale production of nonyl alcohol: Standard Oil of Indiana has plant facilities partly completed, will be turning out the alcohol before too long. Whether it will make derivatives (such as the phthalate and other plasticizers) has not as yet been decided.

Recent research, conducted by Drs. George H. Magnum and Kenneth B. DuBois of the University of Chicago, has pointed up the promise that tetraethyl pyrophosphate (CI, May, '47, p. 765) holds as a rodenticide. Among the claims: TEPP yields a faster kill than ANTU, rats do not build up a tolerance to it, and it is readily eaten by rodents in a 0.5 per cent food admixture. Monsanto and Victor Chemical are both appraising the new chemical's prospects.

* * * * *

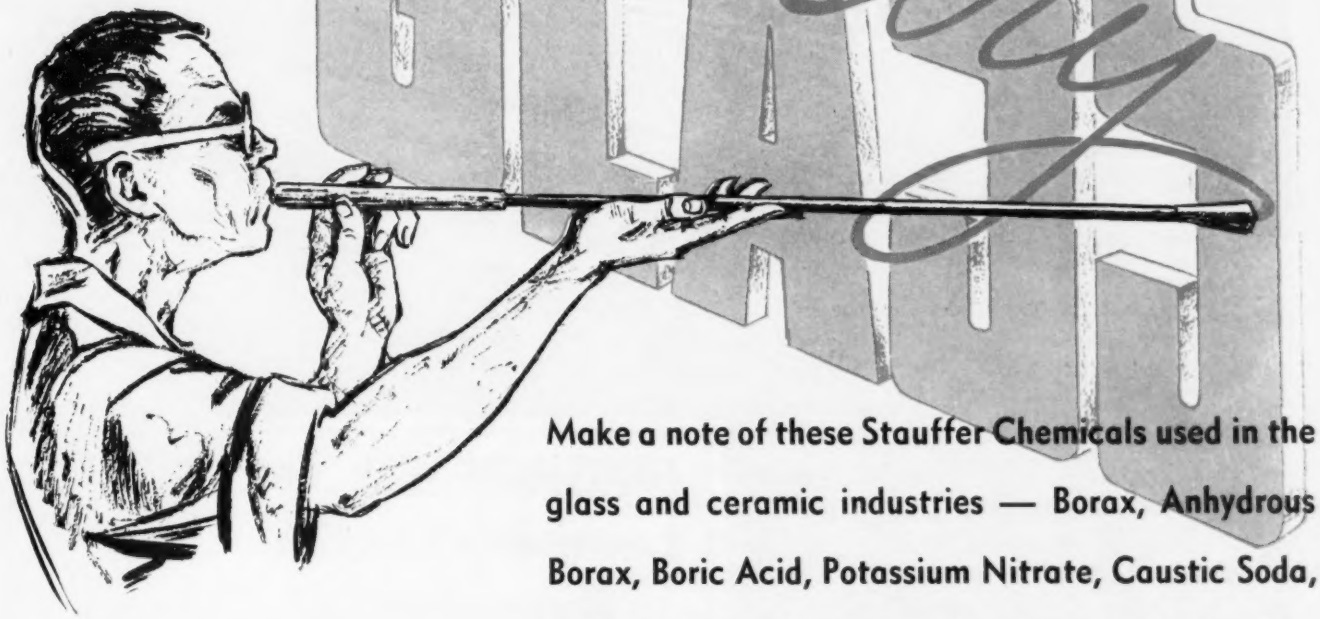
Here and There:

American Potash and Chemical Co. is now pilot-planting a process for the extraction of tungsten from Searles Lake brine, hopes to develop it to commercial stature ... John Powell & Co. has begun to manufacture alpha naphthalene acetic acid, will sell it as a basic chemical to formulators of plant hormone sprays ... One of the alkyl phenols to be made by the Koppers Co. at Oil City is diamyl phenol ... If you market packaged insecticides you may be interested in the advertising plan being followed by Bridgeport Brass Co. Insertions in 150 newspapers are scheduled on the basis of an "insect timetable" the concern has compiled ... Armour & Co. has brought out a series of bovine blood-derived biochemicals, including crystallized trypsin, pepsin, plasma albumin ... American Cyanamid Co. is boosting output of its synthetic catalyst unit at Fort Worth, Texas, by 50 per cent... Two new clays for ceramic and adhesive manufacture will soon be offered by United Clay Mines Corp., Trenton, N. J. ... Sodium silicofluoride, long used in bran mixtures for curbing grasshopper infestations, is encountering rugged competition from benzene hexachloride, chlordane, and chlorinated camphene. Field tests give chlordane and chlorinated camphene the edge. Although BHC has proved generally satisfactory, results have been variable.

The Editors

STAUFFER CHEMICALS

FOR THE *Industry*



Make a note of these Stauffer Chemicals used in the glass and ceramic industries — Borax, Anhydrous Borax, Boric Acid, Potassium Nitrate, Caustic Soda, and Sulphur. On your next order, specify Stauffer for a dependable source of supply of quality chemicals in any quantity.

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- Carbon Tetrachloride
- Caustic Soda
- Chlorine
- Citric Acid
- Cream of Tartar
- Muriatic Acid
- Nitric Acid
- Silicon Tetrachloride
- Sodium Hydrosulphide
- Stripper, Textile
- Sulphur
- Sulphuric Acid
- Sulphur Chloride
- Tartar Emetic
- Tartaric Acid
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INDISPENSABLE for
Leather - Textiles
Dyes - Paints
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and other Industries

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BICHROMATE OF SODA

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BICHROMATE OF POTASH

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You can depend on "Natural"

NATURAL PRODUCTS REFINING CO.
JERSEY CITY, NEW JERSEY

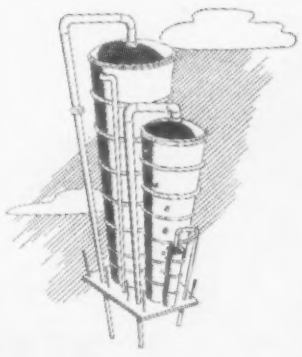
BENCHMARKS OF CHEMICAL PROGRESS

by ***ROBERT L. TAYLOR, Editor***

FROM TIME TO TIME things and events come along which show even more graphically than statistics the strides that are being made in the growth and development of our industrial economy.

This issue of CHEMICAL INDUSTRIES is dedicated to two such benchmarks of progress in the chemical processing field. One is the first Pacific Chemical Exposition, which will be held in San Francisco, October 21-25, and the other is the advances in chemical materials and equipment that have taken place over the past year.

It is fitting that the West should have a chemical show of its own. For while air travel and faster train schedules have steadily been closing the distance between East and West, the West at the same time has been developing its industrial resources at a rate which is winning for it a place in our national economy not based on regional markets alone.



Every year the West has been looming a little larger in the U. S. economic picture. Since 1939 population in the seven Far Western states has jumped 31 per cent; income has risen 179 per cent, sales 171 per cent; and in the chemical field employment has jumped 130 per cent.

Some of the technological achievements behind these impressive gains will be brought out in the three days of Pacific Industrial Conferences to be held concurrently with the Pacific Chemical Exposition. Twelve cooperating West Coast technical organizations have joined together to present a program of some eighty papers on various phases of Western industrial developments and natural resources.

The Exposition, together with the Pacific Industrial Conference, should do much to stimulate exchange of goods and information between West and East. The West needs the equipment and products which Eastern manufacturers will exhibit. Eastern exhibitors and visitors will conversely discover much that Western industry has to offer them. On this basis the Pacific "Chem Show" can play a valuable part in the industrial integration of our country. We wish it well.

Another striking indicator of how far our chemical industry has progressed in the last decade is to be found in this 3rd New Chemicals and New Equipment issue of CI, under the heading "New Chemicals for Industry" on page 431.

Without suggesting that you count them, we will tell you that there are descriptions of 528 new chemicals and chemical specialties in this section, all of which have been introduced by their respective makers since July, 1946. Checking back into our New Chemicals issue of ten years ago, we find a mere 284 new products, and these included all that had been introduced during a two-year, instead of the present one-year, period. On this basis the rate of introduction of new chemical products has roughly quadrupled in ten years.

And while we have no figures to prove it, we know that progress during the decade in the chemical processing equipment ment field, too, has been great. And likewise in the field of chemical packaging.

In all three of these categories—chemical materials, equipment, packaging—CI's editors and contributing authors attempt in this issue to provide a quick review of significant developments during the year as well as a progress benchmark for gauging the future.

The new materials and new equipment described here are among the important competitive tools chemical companies have at their disposal. It is likely that they can also help solve some of the broader current problems facing business and industry that are so ably discussed by Dr. Roland P. Soule in his introductory article starting on page 383. Along with new knowledge, the tools of new materials and new equipment will continue to contribute importantly to chemical industrial progress.

coolest customer an airliner ever had

Swordfish, strawberries, melons, and peaches are the passengers riding a new kind of airliner between Los Angeles and Chicago. To rush perishable foods between these great cities, Santa Fe Skyways built a flying icebox.

Cooled to 120 degrees below zero by dry ice, methyl alcohol circulates through the insulated cabin, keeping its unusual passengers in perfect shape throughout the trip.

Playing airline hostess to a swordfish is an unfamiliar role for methanol, which most people know best as the anti-freeze in their cars. This hard-working chemical is familiar to industry in a hundred everyday jobs. Methanol is a versatile solvent and an important ingredient in cleaning compounds, dyes, paint and varnish removers, plastics, and pharmaceuticals.

Both dry ice and methanol refrigerant for the first Skyway flight were furnished by Commercial Solvents. Commercial Solvents was the first company in the United States to market highly-refined synthetic methanol. It is one of more than two hundred fine CSC chemicals for industry, agriculture, and medicine.

Commercial Solvents Corporation

17 EAST 42ND STREET, NEW YORK 17, N.Y.

What's new

COOL NITRATE IS THE KEY

Chemical investigations are charting ammonium nitrate dangers, have shown that heat and confinement alone are enough to cause explosions. New regulations are scheduled, will realign industrial practice.

THE GRANDCAMP explosion at Texas City caused great consternation among groups concerned with ammonium nitrate; but a second explosion, which occurred less than fifteen weeks later aboard the Ocean Liberty, at Brest, was the *coup de grâce* which hastened decisive action.

The tumult and the shouting died, but chemists attacked anew the problem of ammonium nitrate's explosiveness. How explosive is it? Under what conditions does it detonate? Do organic, caking-preventive coatings sensitize it? Ammonium nitrate hazards have long been known but apparently neglected. New data have reaffirmed and extended our knowledge.

Oppau Remembered

Some remembered the first big nitrate explosion at Oppau, Germany, in 1921 and thought that event might shed some light across the intervening years. Dr. Carl H. Mueller, now of General Aniline & Film Corp., was at that time a chemist at the Badische Aniline & Soda Fabrik plant, where the catastrophe occurred.

Dr. Mueller reports that Germany started making ammonium nitrate for fertilizer in 1915 but considered it too dangerous to sell as such. After World War I the European nitrogen cartel considered it and again thought it too hazardous.

Several modifications were approved—mixture with calcium carbonate was one, reaction with potassium chloride was another—but the most popular was a 50-50 mixture of ammonium nitrate and sulfate. (That proportion gives the double salt, $2NH_4NO_3 \cdot (NH4)_2\ SO_4$, with a slight excess of sulfate.) This is the material which exploded at Oppau. It was pure except for traces of iron oxide, which gave it a tan color.

It is of interest that the I. G. at no time handled crystalline ammonium nitrate, using instead a high concentration solution for fertilizer production.

The detonation was set off by a blasting powder, which was being used to break up caked material. Strangely, the double salt had been blasted about 16,000 times before without difficulty.

Although a crater 150 yards in diameter was formed by the explosion, only 10 per cent of the 4,500 tons was detonated. The remaining material was scattered about and later analyzed. Lack of uniformity was one explanation put forward, but that was disproved by analysis. Experts failed, in fact, to explode it by heat or detonation in conventional tests; but it was learned that admixture with organic material gave an explosive product.

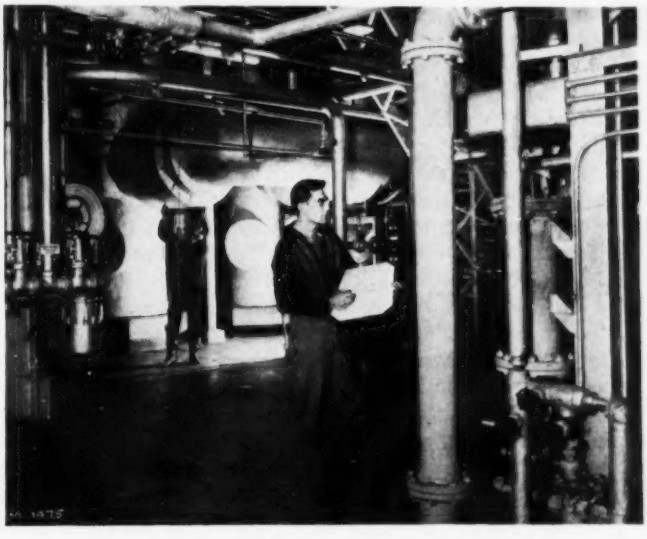
Production of the double salt was continued in Germany, but blasting was no longer permitted. Rather, the cakes were pried apart with hydraulic pressure. After this practice was adopted, no trouble was encountered.

Explosive Initiation is a Sure Way . . .

Even before Texas City, groups in this country were examining nitrate dangers. The WPB had a contract with Underwriters' Laboratories to carry out tests, and this report (dated April 30, 1945), together with some later data, has finally been published by the Laboratories as Bulletin No. 39 (August, 1947).

It seems clear from this work that organic matter—as ordinarily used to prevent caking—sensitizes ammonium nitrate to detonation. Six-ft. sections of 2½" steel pipe were filled with sand

TEXAS CITY: Will this holocaust . . .



NITRATE PLANT: . . . abridge nitrate output?

(control), pure nitrate, and organic-coated material respectively, and fired by a standard military detonator. The pipes ruptured (average of several tests) 7", 21½" and 59" respectively. Conclusions: "The test data . . . show that the detonations of the samples of ammonium nitrate containing organic matter, even in comparatively small amounts, were aparently complete . . . and were considerably more violent . . . than the explosions or detonations under similar test conditions of ammonium nitrate practically free from organic matter. . . . It appears that the sensitiveness of ammonium nitrate to detonation is increased to a marked extent by the organic matter used in the compositions included in this investigation."

. . . But Heat and Confinement are Enough

Granted that an initiating detonation will almost invariably set off ammonium nitrate, still there is no evidence that the two shipboard explosions were started that way. The tests conducted by the Bureau of Mines, therefore, are more pertinent to handling and shipping practices.

The Bureau reported a short time ago that a sample of ammonium nitrate picked up at the scene of the Texas City disaster detonated when it was confined in a steel tube and heated. (This material contained 0.7% paraffin and 3.5% kaolin as a coating.)

More recently G. W. Jones, supervising chemist of the Explosives Testing Section, reported that similar results have been obtained with chemically pure nitrate: "The Bureau has conducted tests using chemically pure ammonium nitrate in a bomb of the same type as that described in the July 28, 1947 issue, page 2143, of *Chemical and Engineering News*. It has been found that chemically pure ammonium nitrate can be detonated by heat and confinement when the bomb and ammonium nitrate are at a temperature of 300 to 308°C."

The Underwriters' tests indicate that organic matter sensitizes ammonium nitrate, but it is clear from the foregoing that even the pure chemical is dangerous. It was further brought out in both cases that the degree of confinement is a crucial factor.

As a result of the two shipboard explosions and subsequent tests, regulations are being formulated to safeguard further shipments of the hazardous chemical. Already the Coast Guard has banned loading or unloading of ammonium nitrate in populated areas by anyone except the Army, and the Army itself has issued new strict regulations for handling: continuous fire watch, no explosives or sulfur on board, no other cargo in hold where ammonium nitrate is stored.

Several agencies — the Army, Navy, Coast Guard, Bureau of Mines and Bureau of Explosives—are cooperating in an Inter-Agency Committee, the reports of which will lay down official regulations for handling ammonium nitrate.

Nonchalance Is Passe

The ammonium nitrate industry, according to current opinions, is not going to be guillotined. It may be seriously crimped, however, if insurance rates go up and if handlers demand extra pay for handling explosives. In that case, the German technique of admixture with ammonium sulfate may have to be invoked.

It is more likely, though, that changes will be confined to more careful handling practices. A. H. Nuckolls, who carried out many of the Underwriters' Laboratories' tests, comments, "Personally, I see no reason, in view of the data . . . and the researches now in progress, and the regulations being worked out, why the ammonium nitrate fertilizer industry may not continue to develop."

But gone are the days of "flagrant cigarette smoking" and "complete absence of knowledge of the inherent hazardous nature of ammonium nitrate" exhibited by those handling the material, disclosed by the Coast Guard investigation of the Grandcamp and cited by M. M. Braidech, director of research of the National Board of Fire Underwriters.

Production of ammonium nitrate as a valuable component of fertilizer will undoubtedly continue. But it will—indeed, it must—be handled with strict adherence to reasonable and sufficient safeguards.

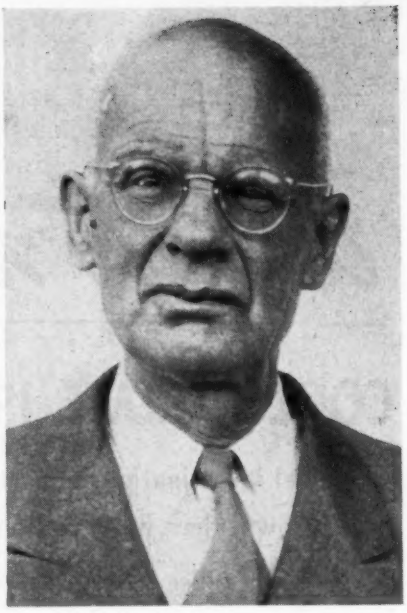
STARCH DERVISH

The most revolutionary process change in 25 years is promised by the use of centrifugal separation for starch production.

THE MAJOR problem in the production of starch from grain is the separation of starch and gluten. The time-honored method of accomplishing this separation in making corn starch has been to pass the water-starch-gluten suspension over long trays, called starch tables removing about 85% of the starch.

Today the centrifuge appears well on the way toward replacing the starch table and revolutionizing starch-gluten separation. Commenting on the advances in the industry over the past 25 years, a representative of one of the major starch companies stated, ". . . few changes have affected the process as much as is potentially possible with centrifugals."

Originally developed to replace the starch tables for the "primary" separation of starch and gluten, exploitation of centrifugal separation was stymied for some time by the high investment which starch producers had in tables, and the high cost of centrifugal equipment. But the starch manufacturers were quick to seize upon the centrifugals for a further



ALBERT PELTZER: Out of a whirlpool, more starch.

separation of the starch-gluten suspension leaving the starch tables, i.e., the "polishing" operation. Here further starch is recovered and a very high-protein gluten is produced.

Birth of an Idea

For many years an idea had been bothering starch engineer Albert Peltzer: the belief that it would be possible to supplant gravity separation of starch and gluten with centrifugal force. After many years he came up with a design, joined the Merrill Co. in 1929. There, where he worked with Harrison S. Coe, a mining engineer, the development reached such a stage by 1930 that the Merco Centrifugal Co. was organized to exploit the new centrifugal, which was capable of separating solids of different densities from liquids in one continuous operation.

Field tests began in 1931 and the first commercial installation was sold the following year to the A. E. Staley Manufacturing Co., which used it to recover starch from table tailings. Centrifugation has proved so successful for this operation that every major U. S. starch producer and many foreign ones have installed centrifugals for this purpose. The Sharples Co. and the DeLaval Centrifuge Co. have also made several installations for polishing, but for the moment Merco appears to have preempted the field.

How It Works

As now operated, two stages are necessary to accomplish complete separation of starch and gluten by centrifugal means. Two centrifuges are operated in series, the crude mill starch being fed to the first stage, which is operated to give a good gluten in the overflow. The starch suspension emerging from this stage then passes to the second centrifuge, which

produces a starch containing a very small amount of protein. The overflow from the second stage, containing a little gluten and starch, returns to the first stage.

Operating in this manner, the Merco system is characterized by simultaneous washing with process water as the separation takes place, a controlled amount of wash water entering the separation chamber of the rotator at the periphery of the bowl. The starch is thus discharged via the underflow in the wash and contains only a small amount of solubles, principally glutens. The feed liquor, containing relatively large amounts of solubles, is displaced into the overflow with the gluten suspension. Thus, in the two passes, washing is effected countercurrently and results in a substantial blocking of the solubles at this point.

The Results

Table separation will produce gluten tailings containing 40-50% starch on the dry basis while the centrifugals can reduce the starch content of the gluten to 16-20%, thus increasing the starch recovery from about 85% of the theoretical to about 97%. Not only does this result in more starch but in a more readily marketable high-protein gluten. Another advantage is the short time required to effect the separation: 3-5 minutes as compared to 10-12 hours when using tables. Other advantages are reduction of the amount of material in process and minimization of fermentation difficulties. Further, it is reported that as a result of the decreased solubles (gluten) in the starch produced by centrifugal operation, the final filter cake requires less washing, thus reducing water requirements.

First Wheat . . .

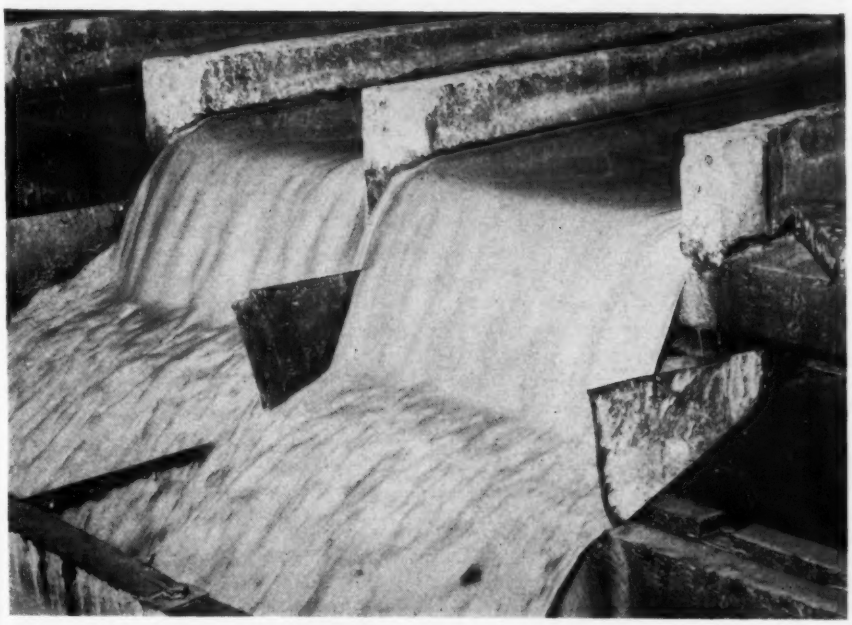
Developed for the primary separation, and first sold for polishing of corn starch, centrifugal separation was used for the first time in the production of wheat starch. This was abetted by the desire to produce the condiment, monosodium glutamate, from the gluten fraction. The first installation of this type was placed in operation in the late 30's by General Mills, Inc. at Minneapolis, Minn., and transferred to Keokuk, Iowa. At present five U. S. wheat starch producers utilize centrifugals for the complete separation.

Then Corn

Ten years after the first installation of Mercos was made, the objective which led to their development, "primary" separation of corn starch and gluten, was realized with an installation in 1942 at the mill of the Hubinger Co., at Keokuk, Iowa. This was followed by complete conversion of the National Starch Products Co., Inc. plant at Indianapolis, Ind. More recently the A. E. Staley Manufacturing Co., the first user of Mercos, has announced its intention of completely removing starch tables from its Decatur, Ill. plant, and replacing them by Mercos. Installations have also been made for the production of both white potato and sweet potato starch, and the Corn Products Refining Co. will utilize centrifugal separation for the production of sorghum starch at its new Corpus Christi, Texas, plant.

Method-Of-Choice

Since all wheat-starch producers utilize centrifugal separation, it would appear that this is the "method-of-choice". The cornstarch situation is not quite so clear. However, the fact that three out of nine U. S. producers have seen fit to discard tables completely, and two others are reported to be making partial conversion makes it clearly evident that a large segment of the cornstarch industry holds a similar viewpoint.



STARCH TABLES: Hours versus minutes.

PROOF OR RESISTANT?

Woolen mills and chemical manufacturers get together with the FTC to establish fair trade practices for wool shrinkage control agents.

UNTIL this summer blanket-hungry women, and men sadly in need of new suits, stood in line to buy anything labeled "all wool." Textile mills didn't have a worry in the world—except to find enough goods to meet the demand.

Things are starting to change now, and woolen mills are having to sell again. Competition is getting keen, and as a result, claims of superior quality are getting extravagant. This is especially true of the new processes for "shrink-proof" woolens and "unshrinkable" yarns. Mills and department stores are falling all over each other in the contest to claim least shrinkage, best "hand," most washability.

Unchecked, such a race could easily lead to disillusioned customers, who—innocent and trustful—have been led to expect too much of treated woolens. So the trade—including the American Wool Council, several textile mills and chemical manufacturers—got together last month with the Federal Trade Commission for a preliminary conference on fair trade practices in labeling and marketing shrink-resistant woolens.

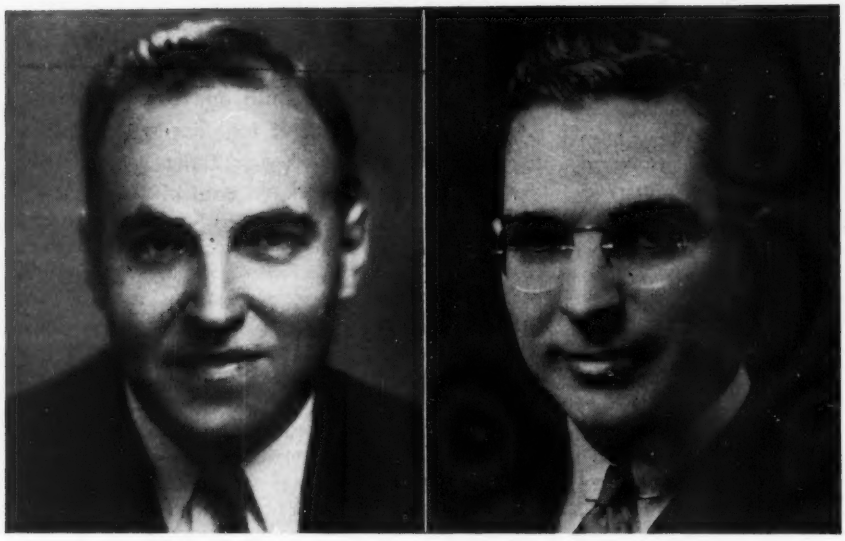
The "All-Wool" Bugaboo

Of primary concern, of course, was the definition of a washable woolen. Some sellers advise customers to throw garments into the washing machine; others warn to wash them by hand. Some claim less than 5 per cent shrinkage; others, 3 per cent; still others, no shrinkage at all. Then, too, even a perfectly unshrinkable fabric isn't washable if the colors run or fade. All these factors—washing method, maximum amount of shrinkage, color fastness—need to be standardized.

A more embarrassing problem is the definition of "all wool." The average housewife makes a fetish of those two words, refuses to buy actually superior blends because the wool content is less than the magical 100 per cent. Now a resin-treated fabric may contain up to 10 per cent resin. Can a 90-per cent-wool fabric properly be called "all wool" or should it be labeled a damning 90 per cent? The FTC would do well to hire King Solomon to untangle that one.

In the few years that shrink control agents have been on the market, several manufacturers with different processes have broken into the field.

American Cyanamid Co.'s Lanaset resin was one of the first, patented originally in 1943 and now covered by Reissued Patent No. 22,566 (Nov. 21, 1944). This is a water-soluble methyl-



VILA and POWERS: "Housewives are too impatient for idealistic hypotheses."

ated melamine-formaldehyde resin. The woolen material, after dyeing, is passed through a solution containing resin, wetting agent and accelerator (to hasten curing of the resin); the cloth is then dried and cured at an elevated temperature.

Monsanto Chemical Co.'s Resloom M-75 is a similar resin falling under Cyanamid's basic patent. Consequently Monsanto is pushing its Resloom HP, an unmethylated, spray-dried melamine-formaldehyde not covered by No. 22,566.

A completely different type of agent is made and sold as Koloc by the Naugatuck Chemical Division of U. S. Rubber Co. This material is understood to be a rubber emulsion, and a similar agent is marketed by Warwick Chemical Co.

Still another process, controlled by York Knitting Mills Ltd., Toronto, doesn't employ any resin at all. The Kroy (spell it backwards) process is a wool chlorination, claimed by the company to give absolute unshrinkability and retention of all desirable qualities of the original wool. York has just completed its first U. S. plant at Lowell, Mass.

Orchids and Brickbats

Each manufacturer is understandably as reticent about the drawbacks of his particular process as he is voluble about its merits. Putting two and two together, the picture looks about like this: The melamine resins are excellent for flat goods, but they lower the tensile strength of the fabric. The rubber resins increase tensile strength and abrasion resistance but are susceptible to aging. The Army found chlorination valuable for wool socks, but that process weakens textiles.

All in all, it appears to be a choice among slight disadvantages, for all processes accomplish well their main purpose. D. H. Powers of Monsanto points out—and in this S. P. Young of Cyanamid and G. R. Vila of U. S. Rubber concur—that the chemical manufacturers' and FTC's interest is only to see that consumer promotion does not go overboard, that "the public shall not be deceived." To this end an advisory committee has been set up, and a public meeting will be scheduled this fall to attack the problems.

Not all woolen men are sold on shrink control. Not that the processes don't work, but "we don't think it needs any improvement." In one way they're right: Wool people have always felt that wool is washable if care is exercised.

But the average housewife is too impatient for idealistic hypotheses: she wants to be able to wash her woolens conveniently and fearlessly. And because the customer is always right, one wool man—with whom the rest are fast agreeing—calls shrink control the "biggest textile development since vat dyes for cotton."

"MUSTARD" FOR MOLDS

The oldest eugenic principle, the "survival of the fittest," has been invoked in penicillin culture through the agency of a poison.

ONE OF THE most significant recent developments in penicillin was reported recently by Mark A. Stahmann and J. F. Stauffer of the University of Wisconsin. They have produced mutations in *Penicillium notatum* by use of the nitrogen "mustard," methyl-bis (β-chloroethyl) amine. The importance of this work is such that it encompasses the whole field of antibiotic research, production, and application.

Stahmann and Stauffers' treatment consisted of adding a suspension of *Penicillium* spores (of strain NRRL-832) to a solution of the nitrogen mustard in aqueous bicarbonate-buffered solution. Spore samples were removed at intervals, decontaminated in a solution of glycine and sodium bicarbonate, stored, and then plated and cultured. After five days the mutation count was made using growth rate, color, degree of sporulation, and character of mycelium as criteria.

Accelerated Evolution

The effectiveness was evident. The mutation rate was raised from 0.1 per cent for the control to 2.7 per cent for the four-minute treatment. A parallel experiment using ultraviolet radiation revealed a toxicity similar to the nitrogen mustard method, but on the basis of spore survival the nitrogen mustard treatment appears to be the more effective method of inducing mutations in this strain.

What is a mutation? It is a "sudden variation, the offspring differing from its

ONE TREATED, ONE NOT: ". . . the public shall not be deceived."

STAHMANN and STAUFFER: The most adaptable survive.

parents in some well-marked character . . . distinguished from a gradual variation in which new characters become highly developed only in the course of many generations." In short, it is an evolutionary speed-up in which the progress of generations is summed up, in a moment, in a single individual.

New Traits

Not all changes, of course, are for the better. But an occasional individual may be far superior in regard to certain traits and father a new and improved strain.

Studies with various other strains of *Penicillia* using nitrogen mustards are continuing, with investigations being made of such biochemical variabilities as nutritional requirements and penicillin producing capacity. The significance of this work for the future is four-fold: more, better, and new penicillins, and the opening of new avenues for all mold and bacterial research via this tool of heredity control.

ONE OF THREE

The evidence suggests that hydrochlorination of ethylene is the best method for making ethyl chloride.

THERE are three good ways to manufacture ethyl chloride: reaction of ethyl alcohol with hydrochloric acid, direct chlorination of ethane, and addition of hydrogen chloride to ethylene.

Ethyl's plans (CI, July 1947, page 39) to expand tetra-ethyl lead capacity—and of ethyl chloride as part of that program—brings up the question of which one is best. Like the Ancient Mariner, Ethyl has chosen "one of three." Since the company has operated all three processes, its decision to use hydrochlorination of ethylene bears the stamp of authority.

Of the three other producers, two (Dupont at Deepwater, N. J. and Hercules at Hopewell, Va.) react ethyl alcohol with hydrochloric acid. The other (Dow at Midland, Mich.) is believed to use Ethyl's process.

The present quoted price for ethyl chloride is 13½¢ per pound in tanks; it has been reported, however, that long-term contracts have been offered for as low as 8¢ per pound.

A Third of a Billion

Because the number of producers is small, no figures are published on ethyl chloride production; but CHEMICAL INDUSTRIES estimates total U. S. production capacity at well over 300,000,000 pounds per year. Approximately 288,000,000 pounds of that is required for tetraethyl lead, and the rest goes into ethyl cellulose and various minor uses.

Three Processes at Baton Rouge

Ethyl's first unit at Baton Rouge (which is no longer operating) utilized esterification of hydrochloric acid with alcohol. This was followed by an ethylene hydrochlorination unit, and a third used direct chlorination of ethane. No HCl recovery facilities were installed, however, and at present the latter unit is operated only when sufficient chlorine is available.

The HCl required for the first two processes is produced by combining the chlorine obtained from the sodium plant with hydrogen piped in from Standard of Louisiana's nearby refinery. This source is not sufficient, as is indicated by the fact that Ethyl is now the largest producer of salt cake in the South. The salt cake is a by-product of HCl production from salt and sulfuric acid in Mannheim furnaces.

All hydrocarbon gases required are obtained from Standard of La. A liquefaction-distillation unit is operated by Ethyl to produce ethylene.

Although exact figures are not available, Ethyl's decision to utilize ethylene hydrochlorination in its new plant is significant. It's experience with all three processes and the availability of raw materials for all three—within the plant or just across the fence—are factors which are strongly indicative of the relative economic merits of the three methods.

CATALYTIC COAL

Esterification catalysts by sulfonated coal, an ion-exchange resin, marks the first advance in that field since arylsulfonic acids.

MINERAL ACIDS are the usual catalysts for esterifications, but they have serious drawbacks. They often cause some decomposition and resultant discoloration. Moreover, when they are neutralized with alkali after esterification of fatty acids, the unreacted fatty acids form soaps which interfere with separation of the product.

A Novel Technique

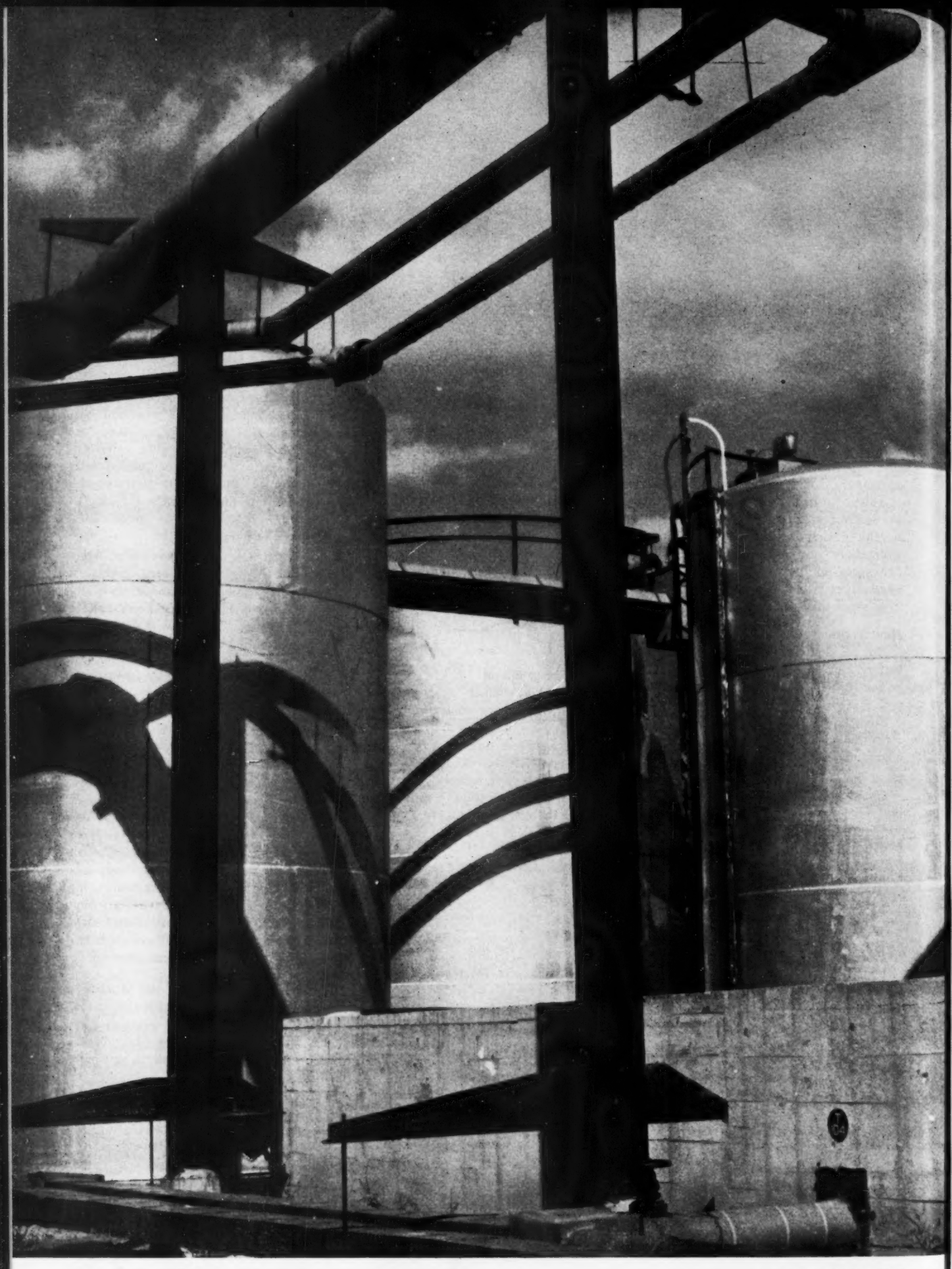
National Oil Products Co., at Harrison, N. J., uses a new kind of catalyst in the preparation of *n*- and *i*-butyl fatty acid esters—used as plasticizers and in textile treating. The new catalyst is an acid-regenerated cation exchanger, Zeo-Karb H, a sulfonated coal. This application culminates research undertaken in 1941 in the laboratories of the Permutit Co. A comparable material used by the Germans during the war was Wofatit-P, a sulfonic acid produced by the reaction of sodium bisulfite with phenol and formaldehyde.

Ion exchangers are relatively expensive, but compared with other catalysts they give better color and per cent yield of the product. Besides, the exchanger can be used for several cycles. National uses it batchwise in existing equipment for about ten cycles before physical attrition of the catalyst makes renewal necessary. Conversion to a continuous system is expected to reduce catalyst consumption.

Easier Separation

Separation of the product is easier, too. Instead of neutralizing the reaction mixture with alkali (and very likely begetting a cantankerous emulsion), a simple filtration does the job.

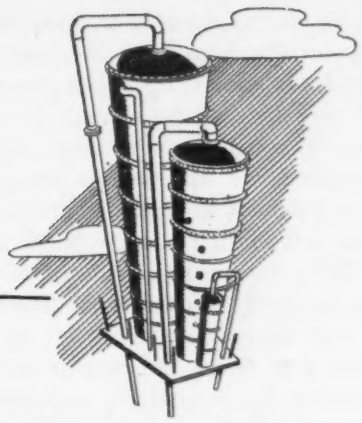
Another possible application is for the esterification of acid-sensitive materials. Acids resinify furfuryl alcohol, for example, but Zeo-Karb H allows direct esterification, albeit in 15-20 per cent yields, without any trace of resinification. Similarly, it can be used for ester alcoholysis, hydrolysis, acetal formation and acetal alcoholysis, but the reaction rates are in general much slower than with acids. Resin catalysts will likely be of value only in those cases where use of acid is precluded.



Durez Plastics & Chemicals, Inc.

Storage bins of the chemical industry—full or empty in the year ahead?

PRODUCTIVITY—Key to a Lasting Prosperity



by ROLAND P. SOULE

WHAT is the true state of business today? Is our country experiencing a real or a fictitious prosperity?

Over 60 million workers are gainfully employed at present—a new peacetime record. The previous peaks were 45 million in 1937 and 46.5 million in 1929. National income is currently running at the rate of about 200 billion dollars a year, compared with 74 billions in 1937 and 87 billions in 1929. And the federal budget is on the surplus side for the first time in seventeen years. Certainly, by these three important tests, we are enjoying a very considerable prosperity today.

But will it last? Is our present prosperity of the type which is self-perpetuating? Or is it just another postwar boom which, although it happens to be the biggest on record, is still doomed to end in a bust—perhaps also the biggest on record?

We all have our hopes and fears as to what the future may hold in store. Some of us have worked out well-reasoned theories which we are willing to back with varying degrees of confidence. But none of us really knows what is going to happen. Economic predicting has always been a risky business and the risks aren't getting any fewer.

But while the economic prophet must build upon conjecture, the economic analyst finds himself on surer ground. Without hazarding any guess as to whether our present prosperity will or will not last, he can state with some measure of confidence what conditions are required to make it last. He can warn of what is dangerous and unsound in the current situation, and he can point the direction we must move if we are to pass from the uncertain present to a more secure future. And it is just such an analysis which, after all, is most important.

The fatalists may be content to guide their actions by what they think the crystal ball reveals, but is the future completely pre-ordained and beyond all human control? If not, let's do the best we can to bend the course of coming events closer to the way which seems to promise the soundest and most durable sort of prosperity for the greatest number of people.

But which is that way? And what can we do that will help move our economy in that direction?

First, we should recognize upon how shaky a foundation our present prosperity has been built. We should face the fact, squarely and dispassionately, that if we simply sit by and let nature take its course we may well be heading directly toward that bust which, as many fear, will be the biggest on record.

Our present prosperity is far too dependent upon conditions which are heritages of the recent war and which are temporary in nature. In particular, it is leaning far too heavily on two important markets which, sooner or later, seem bound to disappear. One is the present abnormally large volume of export trade. The other is the extraordinarily large demand for consumers goods—a demand which accumulated when the nation's productive capacity was concentrated on munitions of war and which still has been far from satisfied.

Our exports this year are running at the record annual rate of 15 billion dollars compared with the previous peacetime high of 8.2 billions in 1920. But our imports will probably be less than 6 billions. The rest of the world must find 9 billions of American dollars to balance its accounts. We must either substantially increase our imports or arrange to extend increased credits abroad if this situation is long to endure. And, barring war, neither alternative seems likely.

But the biggest boost to our economy has been, of course, the re-stocking of our bare shelves and the filling up of the empty pipelines of our domestic commerce. We have been witnessing a demand for consumers goods in a quantity never before approached in our history. To the full extent of our much vaunted industrial ability, we have tried to crowd the business we didn't do between 1941 and 1945 on top of the normal business of the first postwar years.

The result has been a state of prosperity that started by astonishing many observers by its magnitude and that currently is confounding others by its duration. The stock market, which a year ago began to forecast a drastic decline, now appears for almost the first time

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in its history to have been conspicuously wrong—or perhaps to have been right too soon, which in the stock market is the same thing as being wrong. And already the remark is being heard that no longer are we following the conventional pattern of a boom. Instead, it is argued, we have merely recovered our rightful level of production, which is not abnormally high at present but which is simply back, for the first time since 1929, on our long-term curve of rising output.

One thing may be overlooked, however, by those who draw this happy conclusion. It is that the current situation may be no different from previous postwar booms in its basic principle. What most distinguishes it may be simply the magnitude of its dimensions. Our present prosperity is being fed by forces which quite completely dwarf anything we have ever seen before. Great as is our accumulated demand for goods, it has been outstripped by our financial capacity to satisfy it.

The figures speak for themselves. In 1918, at the end of World War I, the total savings of individuals—in bank deposits, life insurance, U. S. bonds, building and loan associations and pension funds—were less than 20 billion dollars. In 1945 they were 170 billions. This is more than three times what they were in 1937, the year of best business before World War II. And the tremendous production of goods in 1946 made no inroad on these savings. At the beginning of 1947 they stood at nearly 183 billions. Truly, as long as public confidence remains unimpaired, and both individuals and corporations retain the will to spend, no near-term end to our present prosperity is yet in sight. So far as the wherewithal is concerned, we have enough to keep production high for some time to come.

But this prosperity, as imposing and durable a structure as it thus appears to be, may still prove to be only another boom. And it most assuredly will be just that unless, in the meantime, we make haste to prop up its shaky foundation with an underpinning it now lacks. That underpinning, without which it cannot hope to survive for many years, is a substantial increase in the productivity of the individual worker.

The Mechanism of a Lasting Prosperity

If we are to have a lasting prosperity we must continue, year after year, to offer full employment to nearly 60 million workers, when 45 millions were apparently enough to satisfy all our requirements in 1937, the best peacetime year since 1929. We must keep our national production not too far below the present level long after our export markets have dropped to normal and our war-accumulated deficiencies in goods have all been satisfied. And we must do all this without resort to deficit financing and the resultant robbing of future generations for the doubtful benefit of the present.

But what products will then be made by these 15 million new workers we have added since 1937? And in what markets can we hope to sell the finished goods?

There can be only one answer to this question. It is not the glamorous new products that will create the necessary demand. Add up all the television sets, room coolers and helicopters that can conceivably be sold in the coming years, and the total will fall pitifully short of what is needed. The answer is far more simple. The greatest opportunity for new production still lies in the old familiar products—in food, shelter, and clothing, in furniture, stoves and washing machines, in automobiles, radios, and refrigerators, in almost everything every shop window displays.

It is true that in 1937 we bought all of these products that we could afford to buy. But our wants and desires were far from satiated within the tight limits of our budget. We would have bought many times as much if our pay envelope had permitted it. Markets become saturated only at specific prices. Whenever we lower those prices in terms of current purchasing power, we open whole new frontiers for production.

There is almost no limit to the heights to which we can push production in this most fortunate of countries. We have in our hands today the world's greatest wealth of raw materials, fuels, hydroelectric power, manufacturing capacity, inventive genius and executive skill. Even if our population should cease to grow and our exports should drop to nothing, our total production can still increase. It can continue in the course it followed so successfully from the end of the Civil War to the beginning of the Great Depression of the 'thirties. In short, it can be absorbed by an ever-increasing consumption of goods *per capita,* which is the economist's way of defining a rising standard of living for the country as a whole.

The Problem of More Purchasing Power

If we are to establish our present prosperity upon a more durable basis, therefore, we must do it by reducing prices in terms of wages. We would then create permanent markets to replace those present ones which are only temporary. But how are prices to be reduced and hence purchasing power increased?

Today some forces in our country are striving to increase purchasing power by fiat. They are pushing up wages while trying to keep prices down. And they aim to provide more jobs by shortening the hours each worker works. The result, of course, will be no real increase in the country's total prosperity, but only a temporary shifting of prosperity from one class to another. A few powerful groups will benefit so long as prices rise less fast than their own wages, but in the meantime, the unorganized and less fortunate groups will suffer. Let every working group share some advance in income, and the pressure on prices will be irresistible. We shall then, of course, have simple inflation, with prices again in gear with wages but upon a higher level. To be sure, those who still have jobs may be no worse off than before, but we shall have committed outright robbery of those who planned to live on pensions, insurance, and other forms of savings. In fact, we shall have ended by shrinking rather than expanding the sum total of our prosperity.

No, the purchasing power of the nation can't be artificially increased by any such quick and easy method. There is only one real and lasting method

of doing it—the slow and hard way of raising manufacturing efficiencies by technological innovations. Since we can consume no more than we are able to produce, we can increase consumption per capita only by raising production per worker.

Increased production of goods per worker can be obtained by any one of three means: more physical effort, longer working hours, or greater productivity per worker as a result of the increased mechanization of his job and improved industrial efficiencies in general. The third means, of course, has been the American way. Our greater production per worker has been achieved, and will continue to be achieved, in the face of a steady decline in both his physical effort and the length of his working day.

The Danger of Relaxing

But perhaps we think that already we are doing everything we can to increase productivity. Perhaps any added move doesn't seem worth the effort. Perhaps we are content to ride along with things as they are, since the going is certainly not too tough at the moment. Before we fall in the easy trap of such soft thinking, however, it would be well to pause for a moment's reflection. In the technological type of economy in which we have been living—and the type in which most of us want to keep on living—the alternative to continued expansion is not stability. It is depression, unemployment, and social upheaval. If we once relax in our efforts to increase production, we shall be unable to keep even as much as we have.

A technological economy is one which, for better or for worse, is committed to a program of ever-expanding production and constant growth. Year after year it yields a higher standard of living through its increasing efficiency in the utilization of men and materials. Year after year it spends more and more money to find new and better ways of getting along with fewer and fewer workers—which is the only way we can all have more and still work less. And hence, if it is always to provide full employment while deliberately reducing the labor required per unit of output, it must always, year after year, increase the number of units which it is producing. Normal business in an economy such as ours cannot be a flat level, therefore, but must be a line pitched sharply upward. We can't let loose the forces of technology and at the same time abandon further growth. It would be like trying to halt an airplane in its forward motion without expecting it to fall crashing to the ground.

We have only to examine the make-up of our industrial structure to see how inescapably our nation is tied to growth. Only about 55 per cent of our manufacturing output in normal times of prosperity is in non-durable manufactures: food, clothing, gasoline, tobacco, and other consumers goods used for routine day-to-day purposes. The remaining 45 per cent is in durable manufactures: steel, lumber, machinery, process equipment, and other capital goods used for the improvement and expansion of our industrial plant.

The division of employment is also about the same, with nearly half of our factory workers engaged in the manufacture of these durable goods. And it is in this area that depressions are bred. It is this important group of workers that must first bear the brunt of unemployment whenever confidence in the future is shaken and plans for continued expansion are halted.

It is true, of course, that the demand for the necessities of life—for food, clothing, shelter and the bare essentials of existence—must continue at all times, whether in booms or in depressions. But it is also true that, in proportion as a nation succeeds in making material progress and in raising its standard of living, these necessities must decline in their percentage contribution to its total production of goods. The more advanced a nation, the lower its ratio of necessities to total output. And, by the same sign, the more advanced a nation, the more vulnerable it is to business depressions and the longer and deeper are such depressions when they occur.

Thus the very magnitude of the prosperity which we are now enjoying represents a hazard which can't be minimized. If we lean back and drift, if we do nothing toward transforming the present boom into a lasting prosperity, the consequences won't be pleasant.

The Threat and the Opportunity

But the situation is by no means desperate. The great prosperity which is ours today—boom though it may be—not only presents a threat but also offers an opportunity. Our economy, long mired in the deep depression of the 'thirties, was struggling to extricate itself when it was overtaken by the second World War. That war, by far the most costly in the history of any nation, increased our public debt in only four years' time by more than 200 billion dollars. It was a mighty catapult that not only lifted our economic aircraft off the ground, but hurled it into the air faster and higher than it had ever gone before. Alongside the impact of this mighty force all the earlier "pump priming" of the 'thirties—measured as it was in sums that once seemed large—was but an insignificant little nudge.

Here then is both the threat and the opportunity. The threat, of course, is that the higher we fly, the farther we have to fall. But the opportunity lies in the fact that, like all aircraft, our economic machine is the safer the higher it flies. If our engine fails, if repair work must be done, disaster is not immediately upon us. And truly, we need all our altitude today. We are still coasting from the tremendous boost that propelled us from the ground, and our engine has yet to sustain the full burden of our heavy craft. If we are to maintain ourselves indefinitely, we must speed up our engine, and without too much delay.

We must do all we can to raise the productivity of the worker. We must devise more efficient methods and we must provide improved machinery. We must forget our tactics of defense and not be content until once again we have turned prices downward. The way will not be easy and victory is not assured. But we need no crystal ball to tell us that the more of this we do, the more the odds will be in our favor.

A marked trend in aliphatic chemistry is towards natural gas as a raw material. Celanese Corporation's plant at Bishop, Texas, is indicative of that tendency.

CHEMICAL RESEARCH AGAIN SURGES UPWARD

NEW CHEMICALS AND NEW EQUIPMENT

• THERE IS USUALLY A LAPSE of several months—even years—between the gleam in a chemist's eye and a new pilot-plant chemical. From 1941 until 1945 there was little time for gleams; almost every erg of creative energy was devoted to the big job at hand—a job overwhelmingly of production.

Manufacturing facilities were quickly converted to peacetime needs, but research had suffered an irreplaceable loss of time and effort. That loss is evident this year, as the curtailed sowing of new ideas during wartime has brought forth, in the course of time, a somewhat smaller reaping of "New Chemicals for Industry" than last year.

But "business as usual"—which in the chemical industry means new products, new techniques, new trends in chemical development—has started to reassert itself; and a resurgence of research activity is manifest. Again CHEMICAL INDUSTRIES has asked experts in various phases of the industry to examine these developments and interpret their significance, for by these trends is outlined the shape of the future.

SYNTHETIC ORGANICS

by H. B. McCLURE,
Vice-President,
Carbide & Carbon Chemicals Corp.

IN THE FIELD of agriculture, organic chemicals took great strides during 1946. In addition to the widespread use of DDT and hexachlorocyclohexane by agriculture, three new toxicants are being produced that show promise of developing into large tonnage items: chlordane, a chlorinated dicyclopentadiene; hexaethyl tetraphosphate; and tetraethyl pyrophosphate, which is effective against aphids and mites difficult to control with DDT.

In the automotive industry, there was a continued development of high quality hydraulic fluids based on the "Ucon" compounds and the development of low-temperature greases based on di-2-ethylhexyl sebacate. A parallel development of the hydrolube type of hydraulic fluids for use in aircraft shows promise. The development of these fluids with low flammability resulted from the series of aircraft fires that occurred early in 1946.

Development and manufacture of synthetic detergents are expanding at a rapid rate. The major effort in this field is concentrated on the production of sodium alkyl aryl sulfonates. Several producers are making the non-ionic alkyl aryl poly-ether alcohol types. Another group is producing detergents which are believed to be the fatty acid esters of the reaction product of monoethanolamine and a halogenated organic acid. In connection with the preparation of detergents, the so-called "Emersol" process for refining fatty acids, involving the use of methanol, is gaining in popularity. Several new plants have been constructed for separating fatty acids using this technique.

Organic chemicals are starting to prove themselves useful in fire fighting and fire prevention. The efficacy of wetting agents to improve the penetration and spreading of water used in fire fighting has been demonstrated on actual fires. As a result of several bad hotel fires in 1946, California has taken the lead in drawing up regulations regarding flammability of drapes and other furnishings used in public buildings. The alkanolamine sulfamate compounds appear to be valuable for reducing the flammability of such articles.

SOLVENT TANNING

An interesting development is now in the pilot-plant stage, the original work having been done at the University of Cincinnati. It concerns a new technique for the rapid tanning of leather. The tanning agents are present in organic solvents such as acetone, rather than in water. The economics of the process remain to be worked out, but the additional cost of solvents may well be outweighed by the speed of the tanning operation and the high quality of the resulting leather.

The chemical literature for 1946 made numerous references to the large-scale plants being constructed to produce organic chemicals and hydrocarbon fuels by variations of the Oxo and Fischer-Tropsch processes. The experimental work of the Bureau of Mines was mentioned, revealing its attempt to produce fuel gases from coal by means of underground gasification.

A wealth of new chemicals were put in commercial production. To mention a few is a means of spotlighting the fields of chemical synthesis being developed:

The commercial production of vinyl ethers and allylidene diacetate was started. A new organic phosphate compound, tri-2-ethylhexyl phosphate, was made available and is useful as a plasticizer for vinyl resins. Commercial production of methylal was announced. Considerable work is being done in silicon chemistry and one manufacturer is offering aminosilane compounds which have unique possibilities as water repellents for textiles and other products.

In the field of petroleum and hydrocarbon gas refining, the commercial use of the hypersorption process for separating low-boiling olefins was announced. One company is now producing phthalic anhydride synthesized from *o*-xylene. The "Unisol" process for the recovery of mercaptans, which involves the use of methanol, is now being used by several

refineries. Petroleum-derived benzene and cyclohexane are now commercially available.

The pharmaceutical industry continues its search for compounds that have specific therapeutic effects. Among the newcomers in this field are Benadryl and Pyribenzamine, the anti-histamine drugs useful in relieving the symptoms commonly associated with allergies; Demerol and Amidone, for the relief of pain; and Pavatrine, the anti-spasmodic. The extraction of rutin, a new drug for treatment of increased capillary fragility, from buckwheat, and the large scale manufacture of streptomycin are now realities.

The developments in plastics and synthetic resins are so numerous that it is difficult to pick out the outstanding new developments. Two new developments that show promise are the production of fatty acid amide resins and the manufacture of resins of the allyl phthalate type.

The printing industry promises to become a large consumer of organic chemicals. The development of the steam-set inks will involve the use of large quantities of glycols, and the use of color in daily newspapers will certainly mean a further need for dyes and colors.

The rubber industry continues to be a large consumer of organic chemicals. One rubber company recently announced a white "carbon black" produced by burning ethyl silicate to SiO_2. The polyethylene amines are being used to some extent in rubber reclaiming, and some of the "Ucon" type lubricants as well as higher polyethylene glycols have proved to be well adapted for the job of lubricating tire air-bags.

SYNTHETIC FIBERS

Tremendous expansions in the facilities for the production of synthetic fibers were announced in 1946. This includes the production of nylon, cellulose acetate rayon, viscose rayon, fibers based on cellulose-acetate-propionate and "Vinyon" N. A new fiber that shows promise is based on a resin prepared from terephthalic acid and ethylene glycol. The "Sanforset" process is now well established in over 30 mills. This process improves the dimensional stability of spun viscose rayon by reacting the rayon with glyoxal.

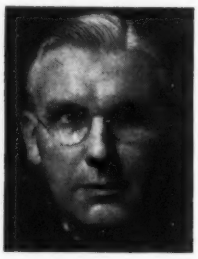
The lumber industry has shown some interest in the use of organic chemicals. One pilot plant in the Pacific Northwest has obtained interesting results from the solvent-curing of lumber. Preliminary results indicate that the cost of solvent-curing may easily be covered by the quality of the lumber produced, the speed of curing, and the value of by-products obtained from the operation. The Forest Products Laboratory published the results of their work on the dimensional stabilization of wood. The process involves the swelling of wood through the use of pyridine and subsequent acetylation of the wood cellulose.

Two interesting developments in the surface coating industry were the development and manufacture of driers based on 2-ethylhexoic acid, and the use of sorbic acid for the upgrading of drying oils.

PLASTIC MATERIALS AND POLYMERS

by H. MARK, Director,
Institute of Polymer Research,
Polytechnic Institute of Brooklyn

FROM THE practical standpoint, high polymers can be roughly classified as rubbers, plastics and fibers. Significant progress has been made during the last few years in each of these types. Such progress can be correlated with



a) The use of entirely new monomeric materials, or the cheaper and better production of monomers which are already known but have not yet been utilized in practice because of their scarcity and cost.

b) The discovery of entirely new polymerization processes or the substantial improvement of existing procedures.

c) The application of entirely new plasticizers, stabilizers, curing methods, etc., or the improvement of existing processing ingredients and practices.

This article intends to give a very brief account of what progress has recently been achieved in the field of rubbers, plastics and fibers.

RUBBERS

A series of new monomers of the butadiene and styrene type have been synthesized: Emulsion copolymers of the GR-S type were prepared and elaborate tests of the processed rubbers were made with special emphasis on low heat build-up, good resistance against abrasion, and high durability in the flex cracking and cut growth test. Most combinations were either inferior or equivalent to GR-S with the exception of those involving monomers which contain either a cyano group (CN) or one or more fluorine atoms. Whether these groups or atoms are in the butadiene or styrene component seems to make no essential difference. In most cases their presence causes the rubbers to have extremely interesting mechanical and thermal properties, and it is reasonable to assume that these new monomers will find commercial use in the manufacture of rubbers and rubbery plastics for special uses. The problem of adequate softeners and tackifiers for the novel Buna S and Buna N type rubbers has entered a new phase in that natural rubber, which is an excellent plasticizer for the various synthetic elastomers, is again becoming available in larger quantities. New tackifiers have also been developed from alkyl substituted polystyrenes, which facilitate the milling operation and provide for excellent sticking of the stock to the tire cord fabric. New and very efficient types of carbon black have been brought out, which permit rapid curing and lead to rubbers of excellent abrasion resistance and flex cracking.

PLASTICS

The progress in this field is so general that it will only be possible to mention the most spectacular achievements, which, of course, are not always the most successful ones commercially. It has been possible to raise the softening range of thermoplastic resins of the acrylate and styrene types either by using new substituted monomers or by incorporating a small amount of a cross-linking agent which consolidates the structure of the polymer. Softening points well above 100° C (up to 150° C) have been obtained, opening large new fields of application for these plastics in the household, in restaurants, hospitals, on trains, ships and planes. New plastics of superior electrical properties have been designed. Outstanding among them is Teflon, with a softening point of 350° C, a dielectric constant of 2.0, a power factor of almost zero and a virtually unlimited resistance to water, solvents, acids and alkalis. Chlorinated polystyrenes exhibit less spectacular, but still very satisfactory properties, and combine them with the ability to be molded, cast, extruded and spun from the melt and from solutions. Polyethylene is another polymer which has equally interesting mechanical, chemical and electrical properties and is on its way to becoming a large scale industrial product.

The coating, laminating and lacquer field is dominated by a large number of vinyl copolymers which are built up with the aid of new monomers and new continuous polymerization methods. Novel plasticizers and new, very efficient stabilizers make these plastics very interesting raw materials for the manufacturing of self-supporting films for use as packaging materials, shower and window curtains, seat covers and outdoor furniture decoration. Most of them can also be used as coatings on fabrics, paper, wood or metals and excel by virtue of their adhesions, surface hardness, water repellency, and chemical durability. Thermosetting resins have been substantially improved by using new basic materials and by being able to obtain soft, resilient and even rubbery combinations in the field of phenoplasts and aminoplasts.

FIBERS

New nylons have been developed. Some of them exhibit typical rubber elasticity and represent an entirely new kind of

textile fiber which is fine, strong, easily dyed, uniform, washable, and at the same time exhibits a reversible elongation of 500-600 per cent. The full synthetic fibers based on polyvinylchloride, the vinyons, have been expanded and improved; they possess a high resistance to chemical attack but are not yet fully satisfactory from the point of view of heat and light aging in the presence of oxygen. Another new fully synthetic material, the so-called fiber A, which combines attractive textile properties with unusual durability in outdoor uses even under very severe conditions, is coming to the fore. From England came news that a polyester made from terephthalic acid and ethylene glycol proved to be a surprisingly good fiber former. This polymer, called terylene, combines a high melting point with excellent tenacity and resistance against water, weak acids and alkalis. Quite recently a very spectacular success was achieved by synthesizing poly-α-amino-acids directly from mono-amino acids, such as leucine and phenylalamine. This reaction leads to materials of very high molecular weight which have been cast into films of amazing mechanical properties. Great progress has been made in the development of better and cheaper spinning processes, which are all fully continuous and produce yarns of great fineness and uniformity.

Engineering research has, on the whole, kept up successfully with the discovery of new products and the invention of new polymerization methods, with the result that a number of very versatile and attractive polymers have been put to public use during the last year.

PHARMACEUTICALS

by ERNEST H. VOLWILER,
Executive Vice-President,
Abbott Laboratories

SINCE CONVERSION to peacetime operation in the pharmaceutical industry was relatively simple and was largely completed in 1945, operation in 1946 and so far in 1947 has had freedom for normal trade development. True, shortages of certain essential materials still exist, but in general the industry has been able to meet domestic needs and a large portion of foreign demands.

The U. S. Department of Commerce estimates that 1946 sales at wholesale of drugs and pharmaceuticals amounted to $1,207,000,000, an increase of 13 per cent over 1945 and 132 per cent over 1939. The above Department had set a normal export goal of $100 million per year for all drug items; in 1946 such sales exceeded $144 million, 25 per cent above 1945; and in 1947, export drug sales are expected to reach $180 million. Of the amount exported in 1946, medicinal chemicals for prescription use — including antibiotics, sulfonamides, and aspirin—represented 47 per cent of the total export sales value. Antibiotics alone amounted to $28 million in export sales. During the same year, imports dropped to less than $9 million, or 21 per cent under 1945. More than half the dollar value of imports was represented by caffeine and natural menthol.

Production of vitamins and hormones has been large. Fifty-six trillion units of vitamin A were produced in 1946, though this was considerably less than in 1945 and 1944. Ascorbic acid production amounted to 617,000 lbs.; thiamine, 185,000; pyridoxine, 10,000; and irradiated ergosterol, 31,000 trillion U. S. P. units.

In spite of the impact of antibiotics, the sulfa drugs were produced in large volume, a total of over 5 million lbs. The largest of these was sulfathiazole, followed by sulfadiazine.

ANTIBIOTICS

Advances of significance continue in the group of antibiotics. Penicillin production in 1946 was in excess of 25,000 billion units, of which approximately half was exported. The rate of production has remained relatively stable for some time, but several plants are being expanded and are coming into operation this year. The foreign demand is still unsatisfied, partly because of lack of purchasing power.

The purity of penicillin has risen during the past year. Much of the current output is in the practically pure, crystalline form, although the amorphous product is still in demand. No further significant progress toward synthesis has been made, and the processes of manufacture by the mold have been so improved that a synthetic process is not needed.

Streptomycin has now established itself as an important drug. The greatest interest revolves around its use in the treatment of tuberculosis, where its value has now been confirmed by organized clinical investigations for which large amounts of streptomycin were donated by manufacturers. The current production rate is approximately one million grams per month, and this is rising. Other antibiotics of interest include the older tyrothrycin and gramicidin, and the relatively new bacitracin, whose place in therapy is as yet undefined. It is estimated that domestic sales in 1947 of antibiotics by pharmacists on doctors' prescriptions will exceed $200 million.

The yield from the extensive war-time research in antimalarials may now be measured. Chloroquin, or SN 7618, is now available as a better suppressive agent than Atabrine or quinine. Another suppressive drug developed in England under the name "Paludrine" will soon be supplied as Chlorguanide by American drug firms. Still another new compound will probably soon be commercially available; it is the curative compound Pentaquine, or SN 13,276. Just recently quinine from the East Indies has again become available in larger amounts, but it is uncertain to what degree quinine can recapture its lost markets from its effective and well-studied synthetic competitors. However, another cinchona alkaloid, quinidine, is irreplaceable in certain heart conditions, and larger supplies now promised are sorely needed.

AMINO ACIDS

High interest continues in amino acids and protein hydrolysates for both intravenous and oral feeding. More specific standards are being established, and products which assure positive nitrogen balance and good tolerability are available.

The synthetic products developed for the prevention and treatment of allergic conditions, including hay fever and urticaria, have become so well established that much additional research is under way to develop similar products.

The most significant product which the German pharmaceutical industry developed during the war years was the pain-relieving drug Amidone. It has undergone extensive chemical, pharmacological and clinical trial, and has been found to be much less habit forming than morphine. Under the name Methadon, the new compound is likely to replace morphine to an appreciable extent.

Folic acid, one of the newer members of the B-complex group, is now in commercial production and is being used rather extensively in the treatment of macrocytic anemia and sprue. Propyl thiouracil will soon replace thiouracil in the treatment of hyperthyroidism because of its greater efficiency and safety. For the first time, effective chemotherapeutic treatment of leprosy is available through the derivatives of diamino-diphenyl sulfone, of which Diason and Promin are best known.

No country other than our own is in a position today to supply a large percentage of the world's need of pharmaceutical products. England, France and Switzerland are doing what they can. Germany is not yet in a position to regain even a small portion of her previously important status. In the meantime, war's aftermath of pestilence and malnutrition has intensified the needs around the globe. By supplying the best drugs known and maintaining intelligent export policies, the U. S. industry should be able to retain its pre-eminent export position. At the same time, the factors of availability of dollars, import restrictions, and future increased supplies from

other countries such as Germany, will make export sales more difficult.

The pharmaceutical industry has been materially improving its manufacturing facilities. Research on biological projects in industry and universities is continuing to accelerate. New reaserch facilities are being built; the principal problem is to find well-qualified research men to fill them. The major developments in recent years have greatly increased the possibilities of extending the discovery of valuable new drugs, and the pharmaceutical industry is well equipped to develop these opportunities.

COAL TAR CHEMICALS

by GEORGE D. BIEBER,
Western District Sales Manager,
Koppers Co., Inc., Chemical Division

FULL DEMAND for bulk coal-tar products and subsequent limited quantities of coal tar available for distillation during the past year greatly handicapped the industry's efforts to make available new chemicals. Therefore, most advances relate to new intermediates and finished products derived from the normal coal-tar chemicals of commerce. A number of these new materials were made by the coal-tar industry but most of them were introduced by other segments of the synthetic organic chemicals industry.

Great progress was again made in the introduction of new pest-control agents. During the year, α-naphthylthiourea came into widespread usage as a rodent poison. The insecticide hexachlorocyclohexane emerged from the pilot plant into larger scale production. A new insecticide, having the formula 1,2,4,5,6,7,8,8-octachloro-4,7-methano-3a,4,7,7a-tetrahydroindane, was marketed and is reported to have high efficiency in the control of a variety of pests. Pyridylmercuric acetate is a new paper-mill slime control agent as is dihydroxydichlorodiphenylmethane. Dinitro-*o*-*sec*.-butylphenol is being offered as a weed killer and dichlorophenyl ether as a control agent for beetles which bore into green timber and freshly sawed lumber. A combination of tetrachloro-*p*-benzoquinone and DDT is said to protect corn and leguminous seeds against decay and damage from weevils, grain moths, and other insects. The effectiveness of pyrethrum has been increased by the addition of such synergists as piperonyl cyclohexanone.

Pharmaceutical research on new drugs for the treatment of human allergies led to the development of β-dimethylaminoethyl-benzohydryl ether (Benadryl) and pyridyl-N-dimethylethylenediamine (Pyribenzamine). Several antimalarials, which resulted from wartime researches and contain quinoline nuclei, such as SN 7618, are now being produced commercially.

New types of resorcinol-formaldehyde resins were developed for a variety of applications. New plasticizers were also introduced, including *o*-nitrobiphenyl.

ALKYL AROMATICS

During the past year alkylated naphthalenes and phenols have become important raw materials in the manufacture of detergents. A new synthetic fiber, derived from terephthalic acid and ethylene glycol, has been developed in England. The fiber is said to have high resistance to microorganisms and bacteria and possesses very low moisture absorption. New dyestuff intermediates include 2,4-dihydroxyquinoline and alkyl carbazoles. Isopropylquinoline is being synthesized for use in the essential-oil industry. Phenylacetic acid is now available in high purity for utilization in perfumery and other purposes. The compounds, 2,5-di-*tert*.-butyl hydroquinone, and hydroquinone monobutyl ether, are being offered as stabilizing agents and 2,5-di-*tert*.-butyl quinone as an organic oxidizing agent.

Demands for practically all of the old-line coal-tar chemicals remained at or above capacity levels. Production of monochlorobenzene, an important raw material in DDT manufacture, had to be expanded because of the increasing popularity of the insecticide. One new phenol plant and several maleic anhydride plants have been announced, resulting from increased demands for these chemicals.

NEW CHEMICALS

A large number of new intermediates and special chemicals is being made in experimental or commercial quantities. Diethyl and triethyl benzenes, secondary butyl benzene, and divinyl benzene are now available as a result of the large-scale manufacture of styrene. Mono- and di-benzyl ethers of hydroquinone as well as the corresponding di-*n*-butyl ether are being synthesized. New phenoxyethanols and higher homologs offer interesting properties. Phenetole, diphenyl carbonate, and various substituted alkylphenols have been announced during the past year. Chlorinated toluenes and corresponding aldehyde and carboxy derivatives are of recent commercial origin. Such compounds as 2-mercaptoethylpyridine; various diphenylamines, phenylenediamines, and naphthylamines; phenyl guanidine stearate and hydrochloride; iso- and terephthalic acids; and 2,5-dichlorbenzonitrile have also been added to the list of new synthetic chemicals. The availability of commercial fluorine and information on fluorinated compounds may result in useful peacetime applications.

INORGANICS

EDITORIAL STAFF REPORT

FLUORINE continued to make news in the inorganic field during the past year. Harshaw Chemical Co. very recently announced a new fluorine cell for laboratories. The outfit is complete, requiring only to be connected to a direct current supply. Also offered by Harshaw are the fluorinating agents: cobalt trifluoride, manganese trifluoride, silver difluoride, mercuric fluoride, and bromine trifluoride. These can be used for organic fluorinations, and the first four may be regenerated. General Chemical Co. is offering commercial quantities of sulfur hexafluoride, a gaseous dielectric, and boron trifluoride etherate, a catalyst useful in the polymerization of unsaturated compounds, cyclization of rubber, reaction of organic alcohols with carbon monoxide to form acids, nitrations and sulfonations, and condensations of the type promoted by aluminum chloride. The use of inorganic fluorides for fluorination of water supplies, to prevent dental caries, is also growing. Optimism for the future of the fluorine industry is evidenced by the purchase, by Pennsylvania Salt Manufacturing Co., of a fluorspar mine in Kentucky.

SULFUR CHEMICALS

Two sulfur chemicals have made news during the past year. Columbia Chemicals Division of Pittsburgh Plate Glass Co. is offering thionyl chloride made by a new process, and General Chemical Co. is offering stabilized sulfur trioxide. The latter material is useful in fortifying oleum, in sulfonation of aliphatics, in di- and polysulfonation of aromatics, elimination of mixed isomers in monosulfonation, sulfonation in presence of solvents (since no sulfuric acid is present), and reaction with amines.

Another inorganic compound whose main use is in organic chemistry is lithium aluminum hydride, described over a year ago as a unique, powerful, and specific reducing agent. It was then a laboratory chemical, but now it is available commercially in small quantities from Metal Hydrides, Inc. Larger quantities are promised in 1948.

Considerable expansion is under way in alkali chemicals. Monsanto is spending $2,000,000 to up its phosphorus output 50 per cent by 1948. American Potash and Chemical Corp. is putting $6,000,000 into soda ash and borax expansion and Wyandotte Chemicals Corp. is investing $25,000,000 in additional facilities, part of which will be for calcium carbonate, chlorine and soda ash. Several other alkali manufacturers hope to increase their output by 1948, especially in soda ash, which is particularly short.

International Minerals and Chemical

Corp. has just brought into production the largest phosphate mine in the country, down in Florida. Mexican sulfur, in the state of Vera Cruz, is being exploited by the Mexican Gulf Sulfur Co. and the American Sulfur Co., S. A. Three nitric acid units each having a capacity of 45 tons per day, are being installed by Lion Oil Co., increasing by 50 per cent its present capacity.

MAGNESIUM

A continuous magnesium process has been developed by Permanente Metals Corp., in which dolomite and magnesia are heated with coke in an electric furnace to 1900° C. The Bureau of Mines has perfected a process for obtaining magnesium oxide from olivine. Tenessee Valley Authority has a process whereby olivine (which is a magnesium iron silicate) is heated with phosphate rock to a temperature of 1500° C. in an electric furnace to give a new type of fertilizer which has an alkaline rather than acid reaction in the soil.

There has been some activity in the field of pigments. E. I. du Pont de Nemours & Co. has perfected a continuous process for dry colors and has also brought out a new hydrated ferric oxide pigment called "Auric Brown." National Lead Company has brought out barium potassium chromate, a new protective pigment for metal coating. A new flatting agent for lacquers and varnishes has been introduced by Monsanto Chemical Co. It is a very finely divided form of silica, similar to Santocel.

ISOTOPES

The production and use of isotopes for tracer studies continue to grow. Hundreds of orders have already been filled by Clinton Laboratories for radioactive isotopes; the most popular are C^{14}, I^{131}, and P^{32}, in that order. Both Eastman Kodak Co. and Sun Oil Co. have announced commercial availability of C^{13}, the heavy isotope of carbon. The former markets $KC^{13}N$, and the latter, $KHC^{13}O_3$. Stuart Oxygen Co. (through the U. S. Atomic Energy Commission) is selling deuterium gas and deuterium oxide. The National Bureau of Standards has perfected a method of uranium analysis which depends upon the use of gallium as a carrier. The volatile gallium carries off the impurities so that their spectra may be read without interference from the complicated uranium spectrum.

Inorganic chemicals have been used by General Electric Co. in a novel way to belie Mark Twain. Finely divided silver iodide, solid carbon dioxide, and other chemcals have been dropped on clouds to precipitate rainfall. It is still too early to guess whether weather control will ever provide a substantial market for inorganic chemicals.

CELLULOSE

by MERLE A. HEATH,
Research Associate,
Institute of Paper Chemistry

THE CELLULOSE industry in the past year has been characterized by a significantly increased rate of production which, nevertheless, has still failed to meet consumer demand. The magnitude of the production increase is indicated by the following tabulation of domestic consumption of three of the largest groups of cellulose products, an increase which has continued into 1947:

	1945		1946		
	Tons consumed	*Lb. per capita*	*Tons consumed*	*Lb. per capita*	*Per cent increase*
Paper and paperboard	19,822,433	284.5	22,411,476	319.3	13
Cotton fiber	2,254,100	32.4	2,422,450	34.5	7
Rayon	383,750	5.5	437,700	6.2	14

Under these circumstances, the major efforts of the producers have been directed toward greater production, by expansion of capacity and by engineering improvements on existing capacity.

Production of chemical or dissolving pulp has been in the neighborhood of 500,000 tons yearly. In the rayon industry the proportion of wood pulp to cotton linters has returned to the pre-war (1937-41) basis of 75:25, after rising to 85:15 in 1942 when linters were substantially requisitioned for explosives; but total cellulose consumption has increased 48 per cent since 1941. The growth of the rayon industry is accelerating and will require more chemical pulp than is now being produced. Increased integration in this industry to include sources of cellulose is one solution which is emphasized by the announced plans of the Celanese Corporation to build a pulp mill in B. C.

RAW MATERIALS

As the supplies of pulpwood diminish, efforts are being made to utilize additional species of woods and, particularly, the hardwoods for pulping. This has long been a major research program of the Forest Products Laboratory of the U. S. Department of Agriculture. The sulfate or kraft process has an advantage in that it can be applied to more kinds of wood to give higher yields and stronger pulp. In the past year, announcement has been made of another newsprint mill to be built in the South, and a mill in the Pacific Northwest to produce bleached kraft pulp from Douglas fir.

Flax pulp is being produced on an increasing scale. It has potentialities for high grade bonds and writings in addition to its use in cigarette paper.

The possibility of raising cotton as a direct raw material for paper is being considered. The pulping of rags is becoming more and more complicated because of the increasing proportion of artificial fibers in textiles, use of resins as finishing agents, and strip-fast dyes.

PROCESSES

A modification of the usual pulping processes, which will be used in a new West coast mill, is the use of magnesium instead of calcium-base sulfite liquor.

The Du Pont company, a producer of sodium peroxide, has taken a leading role in demonstrating the advantages of peroxide bleaching, particularly on groundwood pulp. Several pulp mills have made installations and more are in progress. The use of chlorine dioxide (sodium chlorite), in combination with other bleaching agents or as an auxiliary bleach, also has considerable commercial interest.

WASTE RECOVERY

New equipment for recovering salt cake dust from stack gases in the kraft or soda processes has been developed on a pilot-plant scale. The waste gases pass through a venturi water-atomizer, followed by a dry cyclone; 85 to 94 per cent sodium recovery has been obtained.

A plant to produce alcohol from sawdust and other wood waste was put into operation a few months ago at Springfield, Oregon, and some shipments have been made. It was built by the Government as a wartime project and is being operated by a group of Pacific Northwest lumbermen. Its economic future in competition with alcohol from blackstrap molasses and from petroleum is uncertain to say the least. The present scarcity of alcohol provides an abnormal market, but continued profitable operation depends on reaching full capacity, cutting production costs, and marketing the by-products.

Research by the Masonite Corporation on waste materials has resulted in the recent marketing of two by-products in commercial quantities. One is a water-soluble hemicellulose derived from the hydrolysis of wood by explosion with steam. The second is a very fine fiber containing approximately equal amounts of lignin and hydrolyzed cellulose.

NEW PRODUCTS

Plant-scale production of a water-soluble cellulose compound which is both an ether and a salt, sodium carboxymethylcellulose (CMC), was inaugurated in

November, 1946, by the Hercules Powder Company. It was produced in Germany for a number of years and widely used as a thickening agent and detergent aid. Its potential applications are numerous and may open up a whole new field of cellulose chemistry.

NAVAL STORES

by J. M. SHANTZ,
Manager, Technical Service,
Naval Stores Department,
Hercules Powder Co.

THE PAST producing season, ending March 31, 1947, marked a period of widely fluctuating prices and widely fluctuating demand for both rosin and turpentine and their derivatives. The relatively small stocks of rosin, turpentine, pine oil and other naval stores products on March 31, 1946, coupled with an active domestic and export demand, brought about a sharp increase in price of these products to record levels. However, resistance by consumers to these high prices became evident early in 1947, and shortly thereafter prices of both rosin and turpentine declined rapidly. Domestic buying of these commodities continued to decline during the first half of 1947 as consumers worked off high-priced inventories and began to feel the effects of a lower consumer demand for their products. Poor weather, high labor costs and high cost of materials markedly reduced spring painting and demand for turpentine.

Production of both wood and gum naval stores during the 1947-48 season is expected to increase about 20 per cent over 1946-47. Supplies of both wood and gum naval stores should be adequate to take care of the anticipated domestic and export demand and prices appear to have leveled off. The new loan value for gum naval stores was set at 60.8 cents per gallon of turpentine and $6.30 to $6.48 per 100 pounds of rosin.

TERPENE HYDROCARBONS

The use of α-pinene for the preparation of oil additives slumped considerably during the late spring in 1947, but a somewhat higher total consumption is predicted during the 1947-48 season. Shipments to domestic and export consumers for the manufacture of synthetic camphor are expected to be at a slightly higher level. Prices of turpentine and pinene were sharply reduced but appear to have leveled off with turpentine at about government loan value. Demand for turpentine has been very good during the last several months as a result of lower prices and increased activity in the painting trade. Production of isobornyl thiocyanoacetate dropped off considerably from the peak production during the war; however, several promising new outlets are being investigated which should create a considerably larger demand. Production of terpene ethers was hampered considerably by shortage of methyl alcohol and ethylene glycol during 1946 but this situation has improved recently. These products are being used as solvents and wetting agents in textile chemicals, paints and varnishes, degreasing compounds, and kindred uses.

The use of β-pinene for polymer resins continues to be important business which should expand in the future.

While some interest in allo-ocimene and myrcene for copolymerization continues, no volume consumption has been developed and none is anticipated in the immediate future.

The consumption of monocyclic terpenes for rubber reclaiming has remained at a high level and is expected to continue. Their use as processing aids for GR-S has been reduced considerably because of the increased use of natural rubber. These solvents are finding their way back into uses discontinued during the war, such as raw materials for synthetic resins, and solvents in synthetic resin varnishes and enamels. Consumption of monocyclic terpenes for the preparation of sulfur derivatives for use as oil additives continues to be an important outlet. Production of isoprene from dipentene has practically ceased and conversion to *p*-cymene does not appear economic. Production of menthyl phenol from dipentene was abandoned early in 1947 when lower cost stabilizers for ethyl cellulose were made available.

Supplies of monocyclic terpenes are now adequate for all established uses with prices close to pre-war levels.

PINE OIL

The production of pine oil increased during the past year, but demand exceeded supply during most of this period. During the last several months, demand slackened considerably because of reduced activity in the textile and disinfectant industries; however, resumption of buying has taken place during the last several weeks. The production of steam-distilled pine oil is expected to increase during the latter half of 1947 when Newport Industries' new plant begins operation. Supplies are now believed adequate to take care of anticipated domestic and growing export demand. Prices are being maintained somewhat above prewar levels and no marked reduction is anticipated.

The production of anethole from crude pine oil was increased during the year. Imports of oil of anise from China greatly increased and prices were drastically reduced. The price now seems to have leveled off with adequate stocks in sight. Research on the use of anethole as a chemical intermediate is in progress.

A very good grade of technical terpinhydrate is now being recovered in larger amounts from oils extracted from pine wood. This product is finding a ready market for production of C. P. terpinhydrate, terpineol, and other derivatives.

ROSIN AND RESINS

Rosin remained in short supply during 1946 and prices rose to record levels. Restricted domestic and export buying near the end of the producing season started a reduction in price that continued through June, 1947. Prices appear to have leveled off at slightly above government loan values and heavy export demand is now in evidence. Late spring domestic demand was very dull, reflecting the falling off in consumer demand for synthetic resins and other products made from rosin. Production of wood rosin is expected to increase over 1946 and prediction for gum rosin points to a 15 to 20 per cent increase for the 1947-48 season.

The demand for hydrogenated rosin has fallen off to some extent largely as a result of lower demand as a processing aid for synthetic rubber. The use of glycerin ester of hydrogenated rosin in chewing gum has expanded and may be considered as an established outlet. While the return of natural rubber has affected the use of hydrogenated rosin and its esters in pressure-sensitive adhesives, this field of use is well established and expected to expand in the future.

The use of saponified disproportioned rosin as an emulsifier for the production of GR-S-10 synthetic rubber showed an increase during the past year. However, future consumption is somewhat indefinite because of the uncertain production of GR-S type synthetic rubber. This modified rosin appears to have considerable utility in soaps, synthetic resins, and adhesives and also as a chemical intermediate.

The demand for polymerized rosin exceeded the supply during most of the 1946-47 producing season. The sharp drop in rosin-based resins production during the last several months resulted in a temporary reduced demand. The price of polymerized rosin has generally kept pace with the price of natural rosin with reductions during the last several months. The use of polymerized rosin in pressure-sensitive adhesives, laminating adhesives, printing inks, linoleum, floor tile, and lens block pitches has expanded, and sales in the export field are developing rapidly.

Demand for Vinsol resin greatly increased with the development of a new plastic for phonograph records. This demand has slackened considerably during the last several months as a result of seasonal production of phonograph rec-

ords. Requirement of this resin for use in air-entraining cement, as an extender for phenolic resins, floor tile, and asphalt emulsions continues to tax available supply. The use of an emulsion of this resin as a binder in glass-fiber and rock-wool insulation has expanded considerably. Revival of prewar uses in the export field is progressing rapidly.

NEW DEVELOPMENTS

Pilot-plant production of a primary mine derived from modified rosin was started in the latter half of 1946. Field tests of this new amine have shown interesting results as a cationic reagent for the flotation of non-metallic minerals. It and its derivatives have shown promise in a number of widely diversified fields such as rubber compounding, rubber reclaiming, tire cord treatment, rust inhibitors, anti-corrosion agents, disinfectants and fungicides. This new derivative of rosin bids fair to become an important future outlet for rosins. The corresponding nitrile is also being evaluated.

Commercial production of chlorinated camphene began in May, 1947. This new product is now being extensively field tested as an agricultural insecticide, and its toxicity to warm blooded animals is receiving further study. Also it is being field tested as a mothproofing agent for carpets and upholstery with encouraging results. While the potential market for this new product is not yet known, it appears to have good possibilities as a large future outlet for terpenes.

Field tests indicate that a new terpene mercaptan has interesting possibilities in synthetic rubber polymerization. Also the use of terpene mercaptan copper compounds as an oil additive has been disclosed.

A technical dimer of rosin has been produced in pilot plant quantity and has shown interesting results in synthetic resins, protective coatings, inks, and adhesives.

Copolymerization and cocondensation of rosin and terpenes with other materials is receiving considerable attention and prospects for development of new articles of commerce are considered promising.

A new resin emulsion for plugging oil wells has been announced after several years of field testing.

Research on naval stores products continues to be centered largely in the research laboratories of the major producers of wood and gum naval stores and in the U. S. Department of Agriculture Southern Regional Laboratory. Recently some of the large chemical companies have shown increased interest in terpenes and resin acids as chemical intermediates, which should eventually result in new uses in the chemical field. Fellowships are being maintained at a number of universities for the development of new compounds and for the evaluation of terpene and rosin derivatives in a number of diversified fields. Considerable progress has been made in the identification of the resin acids found in natural rosins and in determining the composition of commercially available terpene fractions through the use of ultraviolet and infrared absorption methods. It is estimated that more than $500,000 annually is being spent on research by the producers of naval stores alone.

DYES

by BYRON L. WEST,
Calco Chemical Division,
American Cyanamid Company

DURING the past year there has been a definite attempt by the dye industry to resume normal progress. The release of materials required for the war effort has added to general production. In all but few instances supply has satisfied domestic demand. Two factors still complicate the supply picture: One is the demand from the export trade formerly supplied by Germany and Japan: the other is the really serious shortage of such basic raw materials as benzene and naphthalene.

This review covers only published articles and patents of the past year and excludes all information from Government sources relative to German developments in the field.

FUNDAMENTAL STUDIES

The American dye industry has always been research conscious. However, we in America are often prone to be self-critical and minimize our own accomplishments. It has been said that very little of the work was fundamental and that it was only applied research with preconceived goals developed under the constant pressure of commercial necessity. That this criticism is not fair is borne out by the progress made in the studies of the fundamental processes of the dyeing of fibers by chemists, physicists and microscopists. Not only has this work added to the world's knowledge but it has resulted in new dyeing procedures and the development of new equipment for the application of colors to fibers.

Work on color and constitution continues to, and probably always will, be of interest. Hodgson[1] discussed Armstrong's quinonoid and triple color center hypothesis from the viewpoint of modern resonance theory, and pointed out that some of the exceptions to Armstrong's theory are explained on the basis of the resonance theory. Eistert[2] showed in regard to the relation between substantivity and constitution that, in general, conjugation enhances the substantivity of dyes.

A very fine article on "The Nature of the Dye-Chromium-Fibre Complex in the Case of Wool Dyed With Certain Chrome Mordant Dyes"[3] discloses that by the bottom chrome, meta chrome and top chrome methods, the complex formed by certain dyes on the fiber has two moles of dye associated with one atom of chromium. These dyes were pure and excess chromium was removed by continuous extraction with normal oxalic acid at room temperature. Gustavson[4] uses ion exchange resins to study chromium complexes existing in solutions in the form of cations, anions and the uncharged state. He provides a method of separating them so that they can be quantitatively estimated. Another study in wool dyeing with chrome dyes[5] discloses that the addition of magnesium sulfate to an alkaline dye bath results in the formation, without appreciably affecting the pH, of a magnesium-dye-complex which exhausts onto wool. This magnesium complex, however, is unstable below a pH of about 7 and changes over to the chrome complex. Thus wool can be successfully dyed with chromable dyes which are not usually applied by the meta chrome method. This can be accomplished by dyeing in a bath which initially has a pH greater than 7, by using optimum low percentage of bichromate, by having magnesium sulfate present, and by employing a surface active agent as a dyeing assistant.

H. A. Standing[6] and his coworkers have continued their excellent studies of the diffusion of direct dyes in cellulose. A diffusion-absorption equation was developed and its validity was tested by applying it to the data of Neale.[7] This equation is partially successful in correlating data obtained when the concentration of the inorganic electrolyte of the external solution is high but it fails entirely at lower electrolyte concentrations.

NOMENCLATURE

Wm. H. Cady[8] makes an extremely logical plea for more system in our dye nomenclature and states that the revision of the Colour Index offers an excellent opportunity to eliminate the lack of uniformity in names of different classes of dyes and the confusion resulting from it. C. L. Bird[9] published an extended list of British, French and Swiss dyes and classified them according to use, chemical constitution and makers.

ANTHRAQUINONE DYES

Of particular interest in anthraquinone intermediates is a new process for the preparation of anthraquinone by the direct vapor phase catalyzed reaction between phthalic anhydride and benzene.

Several patents have been issued in

the past year on process improvement for some basic anthraquinone intermediates and reactions, such as the preparation of Bz 1 chloro benzanthrone (useful in the isodibenzanthrone synthesis); the preparation of Bz 1:Bz 1′ dibenzanthronyl (used in dibenzanthrone synthesis); an improved process for 1-amino-4-bromoanthraquinone-2-sulfonic acid, or bromamine acid, a basic intermediate for the acid wool colors; and an improved process for the Ullmann reaction for the preparation of anthrimides, of great importance as intermediates for the carbazole dyes.

Process improvement on old anthraquinone colors, which should result in lower cost and better quality, is disclosed in patents dealing with pyranthrone (for oranges), polyanthrimide carbazoles (fast yellows), dichloro indanthrene (blues), and diamino isodibenzanthrones (greys).

In the field of new dyes the patent literature reveals no new classes of compounds, but some rather interesting developments have appeared in old types.

In the acylamino anthraquinone class the use of *p*-halo benzoic acids is claimed to give dyes of greater stability to dyeing conditions. Some interesting new dicarboxylic acids derived from dithiazolanthrone have been used for acylating amino anthraquinones resulting in a variety of shades from yellow to olive. Strong yellow to orange vat dyes are obtained by the reaction of aromatic dicarboxylic acids with 1-chloro-2-amino anthraquinones, followed by ring closure to the anthraquinone bis-thiazoles.

Probably still reflecting the war-born interest in olive drab colors, olive to greenish grey shades are obtained by new combinations of the benzanthronylaminoanthraquinoneacridine (Olive Green B) structure with aminoanthraquinones through a carboxy amide linkage; and in the combination of the 4-amino-anthraquinonebenzacridone with 4-aminoanthraquinonenaphthcarbazole through an aryl carboxylic acid linkage.

A new process has been disclosed for the preparation of Indigosols by reacting the phenols or leuco quinones in alkaline aqueous medium with sulfur trioxide compounds of tertiary alkyl amines.

Interest in anthraquinone acid wool dyes centered exclusively in 1,4-diaminoanthraquinone derivatives; more particularly in derivatives of 1-amino-4-arylaminoanthraquinone-2-sulfonic acid.

The use of an aminodibenzfuran ring in position 4 is claimed to give dyes particularly suited for union dyeing of nylon-wool and nylon-silk mixed fabrics. Improved leveling is claimed for the type derived from (*p*-aminophenyl) methyl carbamic esters. The introduction of an additional sulfonic group in position 6 of the bromamine acid residue is claimed to give improved appearance in artificial light.

New compounds carrying as the only solubilizing group a sulfato group in a hydroxyl alkyl chain of the 4-amino nitrogen are claimed to be particularly level dyeing.

Somewhat out of the beaten path are some new derivatives of 1-benzoylaminoanthraquinone-4-benzocarbazole carrying an azo group in the benz ring, which give brown shades.

ACETATE COLORS

In the class of anthraquinone acetate colors, interest has continued to center on compounds derived from quinizarine. The replacement of only one OH group by an amino group in quinizarine is claimed in a process operating in aqueous or alcoholic solutions. Some slight modifications of well known 1,4-dialkylaminoanthraquinone types, such as etherification or acetylation of OH groups in the hydroxy alkyl chains, are claimed to improve sublimation in dyes for printing acetate. The use of long aliphatic chains in 1,4-diaminoanthraquinone derivatives produce dyes particularly suited for use in acetate spinning solutions.

Derivatives of naphthazarine (in place of quinizarine) although inferior in light fastness, are claimed to give equal brilliance, and are resistant to gas fumes.

Incidentally, for this improved resistance to gas or acid fumes, many cationic active agents have been proposed—triethanolamine, N,N′-diphenylethylenediamine and cationic agents along with 3-amino-4-heptanol. Melamine, and particularly the fast to washing melamine resins, have been found greatly to improve resistance to gas fumes.

A revival of interest in the use of anthraquinone acid wool colors (bromamine acid derivatives) for dyeing acetate is apparent.

PRINTING ASSISTANTS

A long series of printing assistants which are probably oxygen carriers are included in the aryl ammonium sulfonates of anthraquinone, in the aryl, alkyl and acyl derivatives of anthraquinone sulfonamides and in the list of compounds from aminoanthraquinone reacted with aryl alkyl or substituted acyl derivatives.

An improved printing composition is claimed for the use of caffeine in an Indigosol printing paste.

Although there are no startling discoveries of entirely new intermediates, patents have been granted on dyes using 1,3- and 2,7-dihydroxynaphthalene, 3-hydroxy-4,4′diaminodiphenyl (a mono hydroxy benzidine), 8-hydroxyquinoline, 3,5-dihydroxybenzoyl chloride, 5-nitro and 3-nitroanthranilic acids and acylacetonitriles, particularly aromatic derivatives.[10] These latter produce "fast to light" metal-complexes of excellent color value. It is interesting to note that these acid dyes before metallization show poor color value. However, when applied by the meta chrome process, the color value is excellent.

New direct dyes feature tetrakisazo violet browns and olive greens; polyazo stilbene dyes by coupling tetrazotized diamines containing a stilbene grouping with a pyrazolone coupling component; disazo dyes which are bluish to yellowish reds by coupling diazotized amino azo dyes to 8-hydroxyquinoline; and direct dyeing azo dyes which contain a 3,5-dihydroxybenzoyl amino group.

The metallizable direct dyes are either premetallized or after-treated with copper as the coordinating metal. One process improvement for metallizing ortho dianisidine dyes claims brighter shades by the use of metallic copper in the reaction with the ammoniacal cupric salt. New metallizable dyes are disclosed as produced by coupling diazotized 2-amino-1-hydroxybenzene-6-carboxylic-4-sulfonic acid to one side of 1:3-dihydroxynaphthalene and to the other side the diazo azo compound of tetrazotized benzidine coupled to salicylic acid. Polyazo dyes capable of being coppered have been patented and are prepared by coupling tetrazotized ortho dianisidine to the monoazo dye obtained by coupling diazotized 5-nitroanthranilic acid ortho to the amino group on 2-amino-5-hydroxynaphthalene-7-sulfonic acid. Either two molecules of the dye or one molecule together with a molecule of 2-naphthol-6-sulfonic acid are coupled to the tetrazo. Another new dye is prepared by coupling salicylic acid and a pyrazolone to tetrazotized 3-hydroxy-4:4′diaminodiphenyl.

Among the new azo cellulose acetate dyes are found the yellow monoazo dye, 4-chloro-2-nitro-4′ethoxyazobenzene, which is of the water-insoluble dispersed type; and the acetone-soluble disazo product prepared by coupling diazotized 4-nitro-4′aminoazobenzene with 3-steroylamino-N-diethylaniline. This latter is mixed and incorporated in the cellulose acetate spinning solution. A patent was granted for a developing bath for cellulose acetate dyes prepared by dissolving the beta hydroxynaphthoic acid in sodium formate solution.

AZO WOOL DYES

New wool dyes are not numerous. Metallizable monoazo compounds include an amyl amino nitrophenol diazotized and coupled to a phenylmethylpyrazolone sulfonic acid as an example of the chromium pre-metallized type; and for the chrome mordant type we have the product formed by reducing the nitro group ortho to the azo group of the dye prepared from coupling to a β-naphthol sulfonic acid to diazotized 2-amino-3-nitrobenzoic acid. This reduction of the azo dye produces a 2-aryl-1:3-arylentriazole.

A new chroming agent, sodium chromium salicylate, for producing water-soluble chromium complexes for dyes which contain no sulfonic acid group is disclosed. Heretofore, with the usual agents employed for making chromium

complexes, the water-solubilizing carboxylic group produced water-insoluble complexes. Thus the salicylic acid dyes can now be pre-metallized to form soluble complexes.

Red disazo wool dyes are disclosed as prepared by coupling Gamma acid to tetrazotized diaminodiphenylsulfones or sulfoxides.

Recent advertisements disclose zirconium toners of organic acid dyes which are insoluble zirconium salts. Dyes may be precipitated in the absence of the substrate required for lakes and the following advantages are claimed for the process: Much higher strength; elimination or alleviation of bleeding; better control in manufacture; use of less materials in making; maximum efficiency in making.

There have been several azo pigments disclosed which are copper, nickel, cobalt or chromium complexes of azo compounds devoid of sulfonic acid groups.

AZOICS

New coupling components, or Naphtholes, have been disclosed in the morpholino-phenylamino arylides of ortho hydroxy acids. Their reduced substantivity is claimed as an advantage because it permits easier removal of the excess Naphthol from the cloth. The addition of small amounts of beta hydroxynaphthoic acid in combination with Naphthol AS produces a greener shade of blue with dianisidine in printing.

New stabilizers are disclosed for diazo compounds. In the use of primary or secondary aminobenzene carboxylic or sulfonic amides derived from polyhydroxyamines, new diazo-amino compounds are formed which are useful in printing. New fast salts are claimed which are salts of diazo compounds of sulfonic acid of heterocyclic compounds such as quinaldines, pyridines, thiophenes, furanes, cumarines and pyrazoles.

PHTHALOCYANINES

Two process improvements have been patented for avoiding or decreasing the foam in the preparation of copper phthalocyanines: one uses biuret instead of urea and the other uses aromatic sulfonic or carboxylic acids in the urea process.

New copper phthalocyanines substituted by sulfohydrazide groups are disclosed as well as those made from nitrobenzoyl, phenoxy or phenyl-sulfonyl-phthalic acid. The use of green and blue copper phthalocyanines for roofing granules has just been patented. Metal-free pigments from an aryl ortho dinitrile prepared in the presence of methyl glucamine has just been disclosed.

Phthalocyanine research gives evidence of a shift in emphasis from work on pigments to that on dyes. Bright green sulfur dyes with better than average fastness are prepared by heating metal-free phthalocyanine-trisulfonyl chloride with dodecyl mercaptan or thioamides. Greyish green dyes for tannin mordanted cotton result from condensing an aminophthalocyanine dye with a quaternary ammonium compound containing a carbonyl chloride group.

SULFUR DYES

A new sulfur green with better than average fastness to chlorine has been marketed recently. Bright sulfur greens of the phthalocyanine series have been patented. Reds which are of perylene diimide structure and browns prepared from 5-phenyl-1,3,4-trichlorophenothiazone are among the latest innovations. An improved process for preparing sulfur blacks with better exhausting properties has just been disclosed.

BASIC DYES

New dyes have been produced by reacting 2:2':4:4'tetraphenylazadipyrromethine or similar compounds with a heavy metal. The condensation of Michler's hydrol with metadimethylaminobenzoic acid, when oxidized with a heavy metal, produced a lactone with useful properties. New water-soluble chrome complexes of such triphenylmethane dyes as Eriochrome Azurol B (Colour Index No. 720) are produced by the use of sodium chromium salicylate. The need for such bright blues in the metallized line is obvious.

FLUORESCENT DYES

At last there is a "white dye" on the market. It is claimed to be substantive to vegetable fibers and is colorless in visible light. It has an intensive blue fluorescence which compensates for the yellow in the fiber and gives an optical bleach action. This is claimed to have permanence because the product has good light and wash fastness. It gives a whiteness not obtained from ordinary bluing with light absorbing blue dyes or pigments.

Other disclosures of fluorescent dyes include the aminophthalakyloimides greens and the strong fluorescent yellows from 4-β-hydroxyethylamine-1,8-naphthalic acid aliphatic imides.

RESIN BONDED PIGMENTS

The application of pigment colors in textile printing and dyeing involves four systems: (1) aqueous dispersion; (2) solvent dispersion; (3) water-in-oil emulsion; and (4) oil-in-water emulsion.

The first is perhaps the cheapest for use in printing but is poor in utility and is limited by the smaller number and kinds of water-soluble binders that can be used. The solvent dispersion system has found but limited use due to the large amount of solvent used. In addition to the added cost, the disposal of the solvent vapors necessary to diminish fire and health hazards demands extensive ventilation systems. The water-in-oil type is the best for printing but can also be used for pad-dyeing. In such emulsions, the use of increasing proportions of water results in the increased body desired for printing. The oil-in-water system has found large use in dyeing where increasing the water results in the low viscosity which is better adapted for padding.

In the patent literature we find new binders for the pigments in water and oil emulsion systems—vulcanized rubber of the polychloroprene type and that obtained by the copolymerization of butadiene and acrylonitrile. Mixtures of gelled and ungelled resins as binders for resin bonded pigments in water and oil emulsions have been disclosed. A new emulsifying agent has been discovered for water-in-oil type systems and is described as a formaldehyde condensation of the product resulting from the reaction of maleic anhydride and a drying oil.

The brightness of shades, the excellent wash fastness and results on mixed fabrics have given ample justification for the intensive work to improve the resistance to crocking—principal shortcoming of resin-bonded pigments.

COLORING PLASTICS

The many types of plastics and the multifold end uses of the finished products make the coloring of plastics no simple problem. Plastics are colored at various stages of their manufacture. Some are dyed or even lacquered on the surface, but generally the coloring agent—dye or pigment—is added at some convenient step in the manufacture of the plastic.

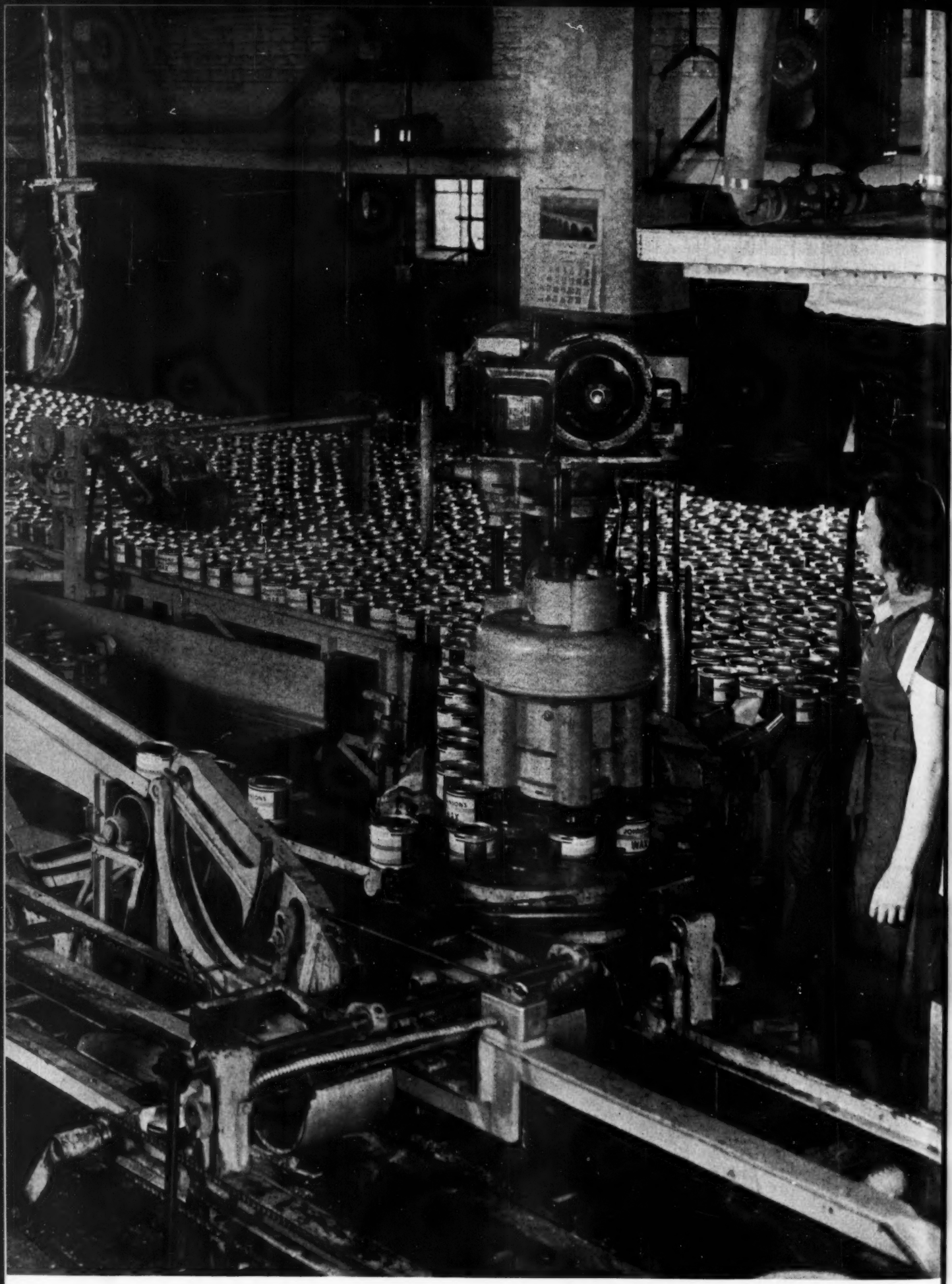
The colors must withstand chemicals, the heat, and the mechanical treatment encountered during the polymerization and moulding. The use of higher temperatures for moulding demands more heat stable colors. The demands on fastness are many and arise from the end use of the plastic which might be that of a baby's toy, a kitchen spoon or an automobile part.

NEW DYEING METHODS

Improved methods for continuously applying vat colors to piece goods and to long chain warps have been developed. The use of new machines which utilize well known dyeing principles has now made possible dyeing by a continuous process. The resulting fastness and penetration of the goods are equal or superior to the results formerly obtained by the batch process which was always attended by inefficiency and difficulty of control.

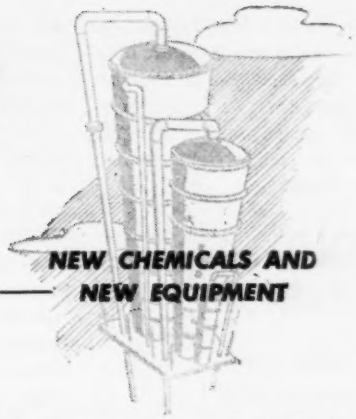
The use of vat dyes for coloring wool stock, tops and yarn has contributed several valuable attributes to the dyed material: (1) A wide range of shades, even in pale tones that can be formulated to possess excellent fastness to light exposure which will satisfy even the exact-

(*Turn to page 425*)



The chemical specialty business has now attained the stature of a mass production, large dollar volume industry.

NEW SPECIALTIES EXPLOIT CHEMICAL RESEARCH



NEW CHEMICALS AND NEW EQUIPMENT

• NOT TOO MANY years ago the manufacture of chemical specialties was a small, struggling business to which makers of basic chemicals paid very little attention. But that is far from the case today. Boasting an annual business volume of $1.5 billion, specialty makers are in the forefront of new chemical exploitation, provide one of the largest markets for chemical manufacturers.

And particular heed is now paid to trends and developments in the specialty business, for the future of many a new research chemical is determined in the specialty proving ground. The very nature of the business—providing compounds to do a specific task better or cheaper—demands that specialty makers be keen evaluators, alert to consumer needs, aware of existing and prospective opportunities.

Recognizing the industry's important stature, CHEMICAL INDUSTRIES presents its second annual New Specialties survey in the form of discussions of developments and trends written by 13 experts. These authoritative observations, plus the descriptions of 170 new specialties on following pages, provides a comprehensive outline of recent progress, points up the courses being charted, the prospects and the promise.

POLISHES

by DANIEL SCHOENHOLZ,
Research Director,
Foster D. Snell, Inc.

WAX FLOOR polishes still command the largest share of the polish field. Manufacturers continue to be optimistic, feel that burgeoning sales are due to increasing appreciation, on the part of the housewife, of the importance of proper floor maintenance.

A definite downward trend in the prices of the natural waxes—carnauba, candelilla and ouricuri — has developed. This is believed due to several factors. Chief among these is the apparent failure of the postwar European market to develop to the extent expected by brokers. Another cause is believed to be the success realized by specialty manufacturers in avoiding the use of these high priced waxes in favor of a variety of substitutes and replacements.

PROMISING WAXES

The most important single technical development which has influenced the downward trend in wax prices is the introduction of high-melting, deoiled, amorphous petroleum waxes and their derivatives obtained by their controlled oxidation. These oxidized petroleum waxes are emulsifiable and may be formulated to give quite satisfactory, low cost, bright-drying wax polishes either with relatively small portions of vegetable waxes or entirely without vegetable waxes. Another result of the acceptance of these waxes has been a movement away from the use of wax-compatible resins in favor of these waxy materials.

The high price of shellac has favored the introduction of a number of alkali-soluble synthetic shellac substitutes as well as use of the Manila copals which are again available. Hydrogenated castor oil, which is again obtainable, is returning to wide use in paste and liquid solvent wax polishes.

Some manufacturers are recommending the use of water emulsion wax pastes for use on asphalt and rubber flooring but there has been little evidence of sustained interest in this direction.

BRIGHT-DRY RESINS

A new brand of bright-drying floor polish which appears to be gaining wide distribution consists largely of an alkali-soluble resin and contains a small portion of dispersed wax. While initial gloss is excellent, the polish film appears to be brittle, lacks the rebuffing property of a true wax polish and is somewhat deficient in water resistance. Although the consumer appeal of such a product, because of the high gloss on drying, is strong, it remains to be seen whether a sustained market for this type of product will develop.

The steady increase in automobile production has produced a resurgence in the auto body polish market. Popularity is shared by the abrasive type cleaner oil polishes and the paste wax polishes. A desire for improved permanence of luster of the oil polish film has led to the inclusion of a portion of hard wax in oil polishes by many producers.

Paste waxes for this type of application require relatively high proportions of hard vegetable wax. The labor involved in buffing the resulting wax films has induced a definite preference for the easier-working oil polishes.

SHOE POLISHES

Certain technical problems in the shoe polish field, related to the need for using relatively high proportions of dyes and the standards set by competition for the appearance and surface characteristics of the paste polish cake, have limited technical progress in the direction of replacement of expensive hard natural waxes. Work in the direction of using metallic soaps as gelling agents has shown some promise, but relatively high temperatures are required to effect solution in the volatile solvents used.

Oil, wax, and scratch remover types of furniture polishes all remain in steady demand. The improvement in castor oil supplies has encouraged the use of sulfonated castor oil in oil emulsion polishes. However, a portion of the market must

now be shared by the newer synthetic emulsifiers which filled the breach during the castor oil shortage. As in the case of auto body polishes many manufacturers are developing oil polishes containing some wax for the purpose of gaining permanence of luster.

HOUSEHOLD DISINFECTANTS

by E. G. KLARMANN,
Research Vice-president,
Lehn & Fink, Inc.

THE situation affecting household disinfectants will be discussed under the three respective headings of coal-tar and cresylic disinfectants, pine oil disinfectants and cationic or quaternary ammonium disinfectants, representing the most important groups of the products under consideration.

Contrary to expectations, the supply picture has not brightened during the past year. Indeed, there is no reason to anticipate any material improvement in the near future.

COAL TAR AND CRESYLICS

The coking plants (supplying the bulk of the tar production from which tar-oil and cresylic acids are obtained) are still being run in short cycles aimed at a maximum output of coke for the steel mills. This method of operation produces a comparatively low yield of coal tar for by-product utilization.

In addition to this, the petroleum fuel oil used to heat the coking ovens has gone up in price very appreciably, prompting some coking plants to use the tar as fuel, in the interest of operating economy. Both factors are contributing to a raw material stringency which is being felt by the producers of coal tar disinfectants of both the soluble (cresylic) and emulsifiable varieties; incidentally, the availability of tar acid oils for the latter type of disinfectant is better than that of cresylic acid for the former. As a result, fortification with phenolic compounds of synthetic origin is being resorted to in several instances, although, as has been emphasized on a previous occasion, the growing experience with some of these germicidal agents fully justifies their continued employment upon their own merits, rather than as substitutes for other materials in short supply.

In any case, it should be possible to keep supplying the market requirements for coal-tar disinfectants, although it will be increasingly difficult to obtain any quantity production of cresylic disinfectants of, for instance, the pharmacopoeial or closely related types.

As to the import situation, moderate quantities of acid tar oils and of cresylic acid are brought in from England. Although their availability was restricted earlier this year, it now appears that they will again be in better supply.

In the pine oil category supply has caught up with demand, and almost any quantity of pine oil is available for the production of disinfectants. This favorable development has been promoted, among other things, by an expansion of the production facilities for naval stores, such as turpentine and rosin, which are obtained more or less concomittantly with the oil from the pine trees and stumps.

Pine oil disinfectants fortified with synthetic phenol derivatives or with quaternary ammonium compounds are beginning to appear on the market.

CATIONIC TYPES

The coconut oil shortage of last year which, if continued, might have affected the output of certain cationic disinfectants (containing the dodecyl radical in their molecule) has passed. At this time there is an ample supply of this type of prodduct. Their variety is also on the increase.

This class of compounds continues to enjoy acceptance in food handling establishments, and for sanitization of eating and drinking utensils. As yet the quaternary ammonium compounds do not appear to play any significant role in household disinfection and hygiene.

HOUSEHOLD CLEANERS

by DOROTHY A. NEIDIG,
Burrell & Neidig, Inc.

CAUTION HAS been the keynote during the past year in the field of chemical specialities, and this has been particularly true of household cleaners. With the ever present threat of shortages, most manufacturers of specialties maintained large inventories of raw materials and containers.

Thus with the seasonal slump in buying, coupled with a reluctance on the part of consumers to stock up, many manufacturers have found themselves unable to reduce their inventories as rapidly as anticipated and consequently have hesitated to offer new products to the consumer. However, since this slack in the retail market for household cleaning compounds is generally conceded to be only temporary, those manufacturers who have not curtailed their research programs are preparing to offer a variety of new and improved products. And certainly, no matter what the market, there is always room for the truly exceptional product.

NOVEL BLEACH

One of the most significant developments in the field of household cleaners has been the investigation of a new solid bleach, lithium hypochlorite. Admixed with soda ash, this compound has been shown to be stable for a period of two years. While production of lithium hypochlorite is still in preliminary pilot plant development much investigational work on its properties has been conducted. Comparisons have been made of a lithium hypochlorite-soda ash mixture containing less than ten percent available chlorine with the ordinary liquid bleaches of five percent aqueous solutions of sodium hypochlorite. When both were used with soap in concentrations of 200 ppm available chlorine (in water up to 400 ppm hardness) the lithium hypochlorite-soda ash mixture gave better soil removal, a higher whiteness retention, and lower soap consumption. This bleaching compound is, of course, not yet on the retail market but should present significant interest for further work by progressive manufacturers.

SURFACE-ACTIVE AGENTS

Increasing acceptance of synthetic detergents by homemakers has been notable. While much confusion still exists in the mind of the consumer regarding "soapless soaps," the increase in sales of the three largest synthetic detergents, Dreft, Vel, and Swerl, for dish washing has been tremendous. The acceptance of these synthetic detergents has been largely among consumers in the higher income brackets. Since 99.6% of people in all income brackets use soap, it is evident that a still larger market exists for these detergents when consumer education begins to take hold.

Further, these surface-active compounds have found increasing markets in rug and upholstery shampoos, floor and wall cleaning compounds, wool, rayon, and silk washes, glass cleaners, liquid floor waxes, and spotting soaps in dry cleaners. The tremendous range of physical and chemical properties of these synthetic detergents make them suitable for formulation in almost every type of household cleaner.

ALKALI MIXTURES

Mixtures of alkali with or without a synthetic detergent have become more popular. These cleaners may be used for cleaning woodwork, dish washing, and softening water. Increased sales have been reported during the past year for

water softening compounds. These alkali cleaners function well for their designed use; however, they have the disadvantage that they do not find daily application.

RUG AND UPHOLSTERY COMPOUNDS

More and more rug and upholstery shampoo manufacturers have discovered the merits of synthetic detergents over soap for this use. Shampoos can be formulated with these surface-active agents which are lower in pH, and which function better in cool, acid, or hard water than soap. In addition clear, sparkling, stable solutions have been obtained with these detergents. The one disadvantage which synthetic detergents possess in this respect is that their solutions tend to wet through the fabric quicker than does soap.

Latex backing for rugs to prevent slipping has been improved although many inferior brands are on the market. An ideal latex backing should be prevulcanized and have a viscosity which lends to easy application by the consumer yet not be so viscous as to slow down automatic filling of containers. The film must not yellow or become tacky on exposure to sunlight, air, or heat.

GLASS CLEANERS

Most of the glass cleaning formulations are much the same as in previous years with the lower alcohols, methyl, ethyl, and isopropyl, being most popular. The Cellosolves, 2-methyl-2,4-pentanediol, and lower boiling mono- and dihydroxy or keto alcohols and esters with good grease solvency are finding increasing markets. Stability of solution in slightly acidic or basic media is, of course, to be considered during formulation and is important when esters were used.

MISCELLANEOUS PRODUCTS

The market for bluings remains relatively constant; however, flake bluing is becoming more and more popular. Several novel ideas for merchandising bluings were introduced this year. One is the incorporation of a blue pigment with a mixture of alkali and synthetic detergent. The mixture has not been developed far enough to give a permanent bluing which will not be washed out from the fabric during the rinse without actually dyeing the fabric. Despite this failing the product has found considerable customer approval. Another novel idea is the pelleting of bluing into individual tablets suitable for bluing one wash load. This idea has been accepted readily by owners of automatic type washing machines. For other washing methods the tablet is a little slow dissolving yet presents a convenient scheme for retailing bluing. The turnover of this kind of product, however, is slow.

Powdered abrasive cleaners find almost 100% usage among homemakers and have found little change in formulation. These cleaners consist of a mixture of abrasive and soap.

Prepared liquid starches have become quite popular during the past year because of their convenience. They are ready for use, requiring only dilution by the homemaker. Thus, they have the advantage that they are easily measurable liquids and thus dissolve quickly and easily. These liquid starches consist of starch; water; a light-fast, water-soluble, blue dye; and pine oil. The pine oil serves to prevent mold formation in the prepared starch and to keep the product from separating. Usually these liquid starches contain less than ten percent total solids. These liquid starches are meeting with customer acceptance in the higher income brackets; however, increasing the retail market to any extent will mean greatly decreasing the present price of the liquid starch.

INDUSTRIAL CLEANERS

by DONALD PRICE,
Technical Director,
Oakite Products, Inc.

TWO trends are evident in recent developments in industrial cleaning. The first is a definite movement toward improved methods of mechanical application of industrial cleaners with the elimination of costly hand labor and greater economy of materials. The second is a wider recognition of the complexity of cleaning problems and the consequent tendency to investigate the basic factors in detergency.

Mechanical improvements are evidenced by the increased introduction of spray washing equipment and conveyorized tank cleaning equipment into the metal fabricating industries. In fact, the conversion to large-scale manufacture of peacetime consumer goods has demanded fully automatic cleaning set-ups to keep pace with the generally accelerated tempo of other operations in production lines.

NEW NEEDS

Self-emulsifying solvent materials in washing machines for precleaning, to remove heavy soil deposits prior to subsequent cleaning operations, have also come into extensive use. The burden upon electrocleaning solutions or other final cleaning solutions is thus lightened. The use of dual purpose cleaning and phosphating materials in spray washing machines for the preparation of steel and aluminum prior to painting has greatly increased.

The railroads have installed mechanical car washing equipment using specially designed cleaning materials on a greatly extended scale, making it possible to clean an entire train in a matter of minutes. The whole machine through which the train passes at a speed of about 100 ft. per minute is operated by one man at a central control station—thus practically eliminating a washer crew with hand brushes and pails. The same trend toward mechanical application of cleaning materials is to be noted in the food processing industries, where a greatly increased demand for sanitation is in evidence. Increased efficiency is thus obtained with a reduction of man hours and a minimum use of cleaning compounds. As examples of such applications, the mechanized process for removal of overflow from filled cans or jars, and the flow-on method of cleaning smokehouse walls in packing plants, may be cited.

FUNDAMENTAL STUDIES

Greater appreciation of the fundamental complexity of cleaning problems has led to a study of the basic factors involved in detergency. Not only the leading manufacturers of cleaning materials, but several committees of the American Society of Testing Materials are devoting attention to such questions. Methods for the evaluation of specific cleaning properties and for the preparation of metals for painting and electroplating are under study by these committees.

An important problem in the study of detergency is the development of methods for determining quantitatively when a surface is really clean. Several investigators such as Spring and Morgan have made noteworthy contributions to the solution of the problem. A program directed toward the investigation of the specific detergent properties of commonly used raw materials, which enter into the composition of industrial cleaners, is also under way.

WETTING AGENTS

As was to be expected there has been a continued development and greater use of wetting agents not only of the anionic but also of the cationic and non-ionic types. Moreover, the use of mixtures of non-ionics with the other classes has come into practice. Effects are produced by this means which are not possible by the use of a single type of wetting agent. Too, it is now beginning to be recognized that the scientific basis for such phenomena is not understood. Much fundamental research is needed to clarify the many factors which enter into the complex phenomenon of detergency. Quaternary ammonium compounds have been widely adopted for use as bactericides in the dairy industry with good results. It is well, however, to recognize the limitations of this class of materials.

If one may hazard a prediction for the future, it is that a considerable growth of industrial cleaning is likely to take place with wider recognition of its importance as an industrial process. There is certain to be continued emphasis upon mechanical methods of application of cleaning materials. Furthermore, the future will see many more scientific investigations of the fundamental basis of detergency, both on the part of the manufacturers of cleaning materials as well as technical groups, with consequent developments in cleaning and surface preparation not possible in the present state of our knowledge.

HOUSEHOLD INSECTICIDES

by G. ALLEN MAIL,
Entomologist, Boyle-Midway, Inc.

IN HOUSEHOLD insecticides as in so many other fields during the post-war period, there have been radical developments. Not only did wartime research for substitutes for materials in short supply produce many new and promising insect toxicants; but the attitude of the public, or the consumer, has also undergone a change.

Up to relatively recent times a household insecticide was, to the home owner, just a "bug spray," bought on its advertised claims rather than because of the formula on the container. Fly sprays such as Fly Ded, Black Flag, Flit, or Fly Tox, enjoyed a good sale, and their names became familar to the buying public. However, the tremendous publicity given to DDT stimulated interest in the constituents of fly sprays and the consumer has become more critical regarding the ingredients incorporated in a spray.

CRITICAL CONSUMERS

The days when a manufacturer could put any toxicant in a kerosene base and sell it as a fly spray are gone.

Too, Federal and State regulations on labelling of economic poisons have familiarized the consumer with the names of several new toxicants, and competition has resulted in greatly improved and more economical products. The consumer too, is becoming more receptive to new ideas and less prone to discredit what would formerly have been thought to be exaggerated claims. Toxicants such as DDT, Rhothane, chlordane, Gammexane and Toxaphene have been demonstrated to do all that was claimed for them, and the consumer now accepts these claims without question.

AEROSOL ACCEPTANCE

The advent of the aerosol bomb, which has been eagerly accepted by the public, has led to research on particle size, more efficient valves and better formulations. This in turn has stimulated research on better mechanical sprayers, the more efficient of which can produce a molecular dispersion of a household spray almost equal to that of an aerosol bomb.

Insecticidal powders for household insecticides also have advanced a long way since the days when pyrethrum, sodium fluoride and borax were the three standard ingredients. DDT, chlordane, stabilized and synergized pyrethrums, and thiocyanates all are effective and widely used ingredients in insecticide powder formulations.

One of the most striking advances in household insecticides is the development of toxicants having a residual effect that lasts in some cases for weeks if not months. The first of these residual toxicants was DDT and its demonstrated long-lasting toxic effect against flies, mosquitoes and bedbugs immediately inspired a search for other residual toxicants. These remarkable residual properties have in turn resulted in the appearance of such items as DDT-impregnated wallpapers and DDT liquid coatings for garbage pails, window screens and woodwork in kitchens and food establishments where flies and roaches are a problem. Such liquid coatings generally contain a volatile solvent and a resin to hold the toxicant on the surface, and they may be applied with a brush or spray.

So-called residual sprays with DDT, chlordane or similar toxicants may in time supersede insecticidal powders for household use. They are less messy, less conspicuous and longer lasting in their toxic effects.

EXIT FLEA POWDERS?

Residual toxicants are now being used for veterinary washes, and doubtless flea powders for domestic pets will some day be deemed superfluous. A small percentage of a residual toxicant in the animals' bath will not only kill parasites already present but will confer a prolonged immunity from further attack.

Old and tried toxicants of botanical origin such as pyrethrum, possess the virtue of being insecticidally active but non-poisonous to the higher animals. They have, however, one common failing—they lack stability. Freshly prepared, they are most efficient, but their loss of toxicity in storage resulted in a trend towards the adoption of the more stable synthetics. A recent development, which has restored in part the popularity and acceptance of these botanical products, has been the appearance of antioxidants and synergists for pyrethrums and rotenone which not only extend their shelf life, but improve their efficiency. Where an insecticide that is non-toxic to humans is indicated, such as in restaurants and other places where food is handled, these stabilized botanical insecticides would appear to be the answer.

GARDEN SPRAYS

Among household insecticides might be included sprays for the small garden. Here also the old standard formulas containing Paris green, lead arsenate and nicotine sulphate have been replaced largely by DDT wettable powders, dusts and emulsions, and more complex formulations containing both contact insecticides for sucking insects and stomach poisons for chewing forms. Garden dusts, too, have been formulated with the new synthetics which combine contact and stomach poisons with a fungicide.

In the rodenticide field alphanaphthylthiourea (ANTU) and sodium fluoroacetate (1080) have given striking results; but "1080" is too deadly to place into the hands of the general public.

Hardly a week passes without the appearance of some new synthetic insecticide. Many of these, on rigorous testing, will not live up to the patent claims but a few will be spectacular. So far there is no such thing as an all purpose insecticide. It was thought for a while that DDT was the answer to all insect problems but it has its limitations. Certain insects against which DDT appears to have little effect, have proved to be highly susceptible to chlordane, benzene hexachloride or other new insecticides.

WISE USE OF DDT

The consumer of insecticides must be taught how to use the new insecticides to get optimum results. For a while, when DDT was first released for public use, advance publicity warned the consumer that he should not accept any formulation containing less than 5% DDT and insecticide manufacturers were compelled to formulate accordingly. As the average householder only sprays a fly when she sees it, and as little as 0.25% DDT is sufficient to kill flies, when used in a space spray containing an efficient knockdown agent, the 5% recommendation resulted in a tremendous waste of DDT at a time when the supply was totally inadequate to meet the demand. Furthermore, continued use of a 0.25% spray has a cumulative effect in building up the residual film that early advertising stressed as an important feature of DDT sprays.

Advertising for the newer insecticides is more conservative and will greatly benefit both the consumer and the industry.

INDUSTRIAL ADHESIVES

by JOHN DELMONTE,
Technical Director,
Plastics Industries Technical Institute

DEVELOPMENTS in adhesives have been marked within the past few years by the remarkable progress of synthetic resin and rubber adhesives. These have made possible applications which would be impractical for those adhesives of animal, vegetable or protein origin.

The superior moisture, fungi, and weather resistance of the synthetics are well known and adequately brought out in the splendid publications of the Forest Products Laboratory. Advantages are now apparent not only in properties but also in processing qualities. For example, the growing importance of high frequency gluing is possible only because of the ease with which the synthetic thermosetting resin adhesives can be cured with heat.

This presages a new era in building construction and general cabinet work, where within a few minutes a wood to wood assembly may be neatly assembled and completely bonded. Suitable jigs with electrodes properly distributed apply the high frequency field. This simple process represents a major advance over the glued and clamped assemblies which formerly had to be left many hours before the glue cured and the clamps could be removed. High frequency curing is being utilized in the manufacture of flat press plywood and continuous edge gluing of smaller widths of lumber into large construction panels.

NEW MATERIALS

There are a number of new materials on the adhesives horizon. Compounds such as resorcinol-formaldehyde are already well known and standardized in numerous aircraft and naval vessels. However, the past year has brought out a number of the patents which cover their preparation. Too, several companies are now engaged in producing the highly popular resorcinol base adhesives.

In the not too distant future one can expect that greater attention will be paid to the polyurethanes, a new group of thermosetting synthetic resins disclosed in Germany, which are noted for their adhesive qualities. The very reactive di-isocyanates, which when reacted with polyhydroxy alcohols form the polyurethanes, are now being produced in this country. Significant wood bonding agents have been developed from this group. Among other thermosetting synthetics, the furanes have shown themselves to be well adapted to bonding phenolic molded and laminated parts, thus filling in a gap which had not been solved satisfactorily before.

Thermosetting synthetic resins are employed in conjunction with synthetic rubber formulations and several outstanding metal to metal, hot-setting adhesives are known. The volume and frequency of applications are still very much in favor of the wood industry, though the popular appeal of metal bonding techniques has attracted much attention. With chemically cleaned metal surfaces, proper precuring and curing procedures, outstanding joint strengths (over 3000 p.s.i.) are attained, for example, upon 1/16" aluminum, though the care required has militated against widespread use.

LATICES

Thermoplastic synthetic resin adhesives, both as latices as well as solutions, are attaining new prominence. First of all, several companies have advertised polyvinyl acetate emulsions for wood, paper, and miscellaneous bonding. Assured of a higher solids concentration at the glue line than offered by the solvent type, these latices present a new approach to adhesive formulation. Newly developed water soluble resins permit infinite control of the viscosity characteristics of the resin latices. In themselves, water soluble resins possess potential importance as paper and textile sizing agents. Displaying remarkable adhesive qualities, thermoplastic polyvinyl ethers are now available in limited quantities. Some of the types, which are water as well as acetone soluble, may be blended with other resins to increase tackiness.

FRUITS OF RESEARCH

Increased attention has been devoted to adhesion fundamentals, and more research has been devoted to adhesive formulation on the basis of chemical structure. These efforts will ultimately be reflected in improved performance. Natural resins and cellulosics have also come in for their share of attention. For example, urea resins in conjunction with starch will improve the water resistance of laminated paperboard. Starch adhesives may also begin to reflect present researches on esterification and etherification which have yielded superior materials. Rosin esters and their derivatives are being featured as tackifiers and extenders for rubber and synthetic resin formulations. A vast selection of materials lies in this category.

Among the proteins, peanut meal proteins as extenders for phenolics have been proven, and are making bids for consideration. Humectants for animal glue formulations can now be extended by newly developed polyhydroxy alcohols. The list of developments and individual participants are innumerable, though when integrated, they spell a promising future for the adhesives industry.

CHEMICALS FOR AGRICULTURE

by P. H. GROGGINS,
Bureau of Agricultural and Industrial Chemistry, U. S. D. A.

DURING THE PAST few years, a number of well defined trends with respect to the production and marketing of chemicals for agriculture have been noted. These are: (1) the progressively increasing use of synthetic organic chemicals; (2) the increased emphasis on the production and distribution of insecticides in concentrated form, in conjunction with new and more effective additives and carriers; (3) the realization on the part of farmers that an appropriate investment in chemicals gives large rewards in crop production and constitutes a prudent, if not excellent, investment in crop protection; (4) the recognition by members of the economic poisons industry that they can serve agriculture best by providing farmers with warranted crop protection supplying any and all useful materials instead of promoting the sale of any particular product; (5) the increasing cooperation of industry with Federal and State agencies in the development of new chemicals for agriculture, as well as their testing and evaluation in the field.

NEW SYNTHETICS

In the recent past, Chlordane (Velsicol 1068 and Octa-Klor), hexaethyl tetraphosphate, tetraethyl pyrophosphate, Toxaphene, and hexachlorocyclohexane (benzene hexachloride) have been added to the list of synthetic organic chemicals which already includes members of the DDT family, DDD and 2,4-D. The older members of this new group have been studied extensively during the past two years and their limitations have been established with reasonable accuracy. The newer compounds are now undergoing intensive research in laboratories and in the field and a large body of constructive literature regarding their efficacy and specificity will soon be developed.

Of equal importance is the fact that many new insecticides and fungicides have

been synthesized but their availability through customary commercial channels must await the necessary exhaustive preliminary testing to determine whether they have particular merit. In the meantime, however, the demand for the proven synthetics taxes production facilities.

As a result of their experience in producing crops under a price support program, farmers have learned to appreciate the agronomic importance and economic value of chemicals for crop production and crop and animal protection. This realization is undoubtedly a major factor in the sharp increases in crop yields per acre.

BROAD APPRECIATION

Regardless of the future pattern of agricultural production, it appears certain that we can obtain our domestic requirements and normal export commitments for foodstuffs by the cultivation of fewer acres. Farmers today are producing twenty percent more corn from ten percent fewer acres than they did two decades ago. They are producing over fifty percent more potatoes per acre than they did ten years ago. History has shown, however, that accompanying a voluntary or obligatory (adjustment payments) diminution in acreage, there may be a rather widespread practice of employing larger quantities of chemicals to ensure good crop yields from the acreage that is cultivated. This is merely a facet of the agricultural technological revolution that is now well advanced.

LONG RANGE PLANS

Because it is reasonable to relate farm income—hence farmer purchasing power for chemicals—with governmental policy, it is appropriate to note some of the essential programs endorsed by Secretary of Agriculture, Clinton P. Anderson, in his April 21 statement regarding long range agricultural policy and programs before the House Committee on Agriculture: (1) Keeping agriculture geared to developments in other segments of the economy to the end that a high level of income and employment is obtained. (2) Establishing a floor under consumption of farm products. (3) Inclusion of the ever-normal granary storage loans and market agreements which foster orderly marketing.

The large number of investigations that are planned under the Research and Marketing Act will unquestionably tend to create markets for chemicals for agriculture. Many of the proposed research projects relate to the control of crop insects and diseases by means of chemicals. Other studies relate to the improvement of crop yield and crop quality by the use of chemicals. When this body of new information is translated into farmer buying practices, it would not be at all surprising to see a stabilization of the present high levels of chemicals consumption regardless of considerations which may necessitate adjustments in productive acreage, provided the prices of chemicals for agriculture are kept in relation to prices for farm products.

INDUSTRIAL DISINFECTANTS

by PAUL J. AMMAN,
Research Director,
G. H. Wood & Co., Ltd.

FEW GERMICIDES have enjoyed such a phenomenal rise in sales volume, in so short a time, as the type generally known as the surface-active quaternary ammonium compounds or cationic germicides. In spite of the high initial cost of the quaternaries, sales have increased from a humble beginning in 1943, to well over 3,000,000 pounds per annum in 1945. This amazing increase in sales volume is due to the outstanding characteristics of these compounds. Their many advantages over the old-established organic and inorganic germicides—mainly derivatives of coal tar, the halogens, and the heavy metals—have, of course, been discussed in the already voluminous literature published on this subject.

DEODORANT ASSETS

It is a well known fact that most germicides have deodorizing properties where putrefaction is the cause of the odor. However, the quaternaries as well as deodorizing bacterial decomposition also neutralize certain aromatic scents (perfumes, chemicals, etc., and even skunk). The exact reason for this behavior has, as yet, not been definitely established. Some investigators claim that this ability is due to absorption of the odor molecule. The actual deodorization, in most cases, is effected by spraying a suitable dilution directly at the source of the odor.

The writer's personal experiences with germicides over the past two years have been in the fields concerning paper and textile industries, food packing, industrial plants, fisheries, chicken hatcheries, hospitals, hotels, restaurants and canning factories.

It was found that in the paper and textile industries, where cost is of prime importance, the highly efficient synthetic phenols and organic mercury compounds are used successfully. In such instances it is not necessary to have completely odorless or non-toxic compounds. Efficiency in controlling slime-formers and mildew organisms along with low cost are the major requirements of this group of industries.

In the larger food industries, wherever bacteriologists or technicians were employed, the quaternaries were readily received with eager co-operation on the part of the personnel. Such properties as relative non-toxicity, stability, non-corrosiveness, lack of odor, high phenol coefficiency and speed of action, far outbalanced the slightly higher initial cost of these compounds.

COST FACTORS

Nevertheless, as bacteria are invisible to the naked eye, it is rather difficult to interest layman buyers in germicides. However, Professor Morley Jamieson of Winnipeg, has developed a technique for demonstrations to aid an educational sanitation program. He aptly describes his technique as a "Seeing is Believing" method. His procedure is to inoculate specially prepared sterile nutrient agar, in small stoppered display bottles, with swabs taken from surfaces under examination before and after treatment with sanitizing agents. These bottles are left on the display rack at room temperature and observed forty-eight hours later. The difference in growth on the before and after bottles of agar is quite evident and convinces the most skeptical operator as to the efficiency of the germicidal agent used in his particular sanitation process.

POLY-NITROGENS

The main difficulty encountered with the cationic germicides is the well known non-compatibility with detergent anionic compounds, such as sodium metasilicate, soap, etc. Seriously conflicting results are charted when these agents are not thoroughly removed before rinsing with cationic sanitizing agents. This has led research workers to develop non-ionic compounds which would not be affected by cation-active substances. Now it is a practical possibility to combine a good detergent with an efficient bactericidal agent.

Some of the more recently developed compounds in this category are the loosely classified "non-ionic poly-nitrogen quaternary compounds." These compounds exhibit an even lower surface tension than the cationics. Like their predecessors, they are non-toxic and have excellent deodorizing properties. Too, they can be used in the presence of soap or other detergents without impairment of germicidal qualities. It is the writer's opinion that the future trend will be toward these compounds, and they will increase in use in the food handling industry in general, due to the fact that an operation can be eliminated by combining cleaning and disinfecting.

There is still much research work to be done with quaternary ammonium compounds, for, among the numerous members of this family, selectivity against certain organisms is evident. Although the majority of quaternaries on the market to-day were chosen from a group exhibiting low selectivity, the future indicates the interesting possibility of marketng tailor-made compounds to combat the specific organisms encountered in different industries.

LEATHER CHEMICALS

by HAROLD G. TURLEY,
Rohm & Haas Company

THE leather industry, like many other industries, passed through an abnormal period last year consequent to returning from a wartime to a peacetime economy. Price controls, particularly, wrought havoc with production and it was not until the latter part of the year that output returned to a reasonably normal level.

Nevertheless, in spite of much work done on substitutes, leather still remains the preferred material for many purposes —especially for boots and shoes. This preference is clearly indicated by figures: In 1945 thirty-one per cent of all shoes were non-leather, by 1946 this had dropped to seventeen per cent and was still declining. Too, a survey conducted by the American Legion Magazine revealed that a full seventy-six per cent of veterans preferred leather soles for footwear.

IMPORTED TANNINS

As the unique properties of leather become more widely appreciated so the need for complete reliance on domestic materials becomes greater. For many years this great industry has depended on two major vegetable tannins for the manufacture of heavy leathers—for use as shoe soles, transmission belting, and automobile and upholstery leathers. These tans are chestnut and quebracho. It is estimated that consumption of vegetable tannins by leathermakers is of the order of 450,000 tons of extract—25 per cent tans basis—annually.

Chestnut is a domestically produced tanning material, but the ravages of the chestnut blight have seriously curbed output and dimmed the prospects. For the other portion of tannin requirements, the U. S. depends upon quebracho. Actually, quebracho is the world's most widely used tanning material and is produced and exported from one small area, namely, Argentina and Uruguay. In 1946 the export of this material was placed under government control, prices have soared and meant higher costs for U. S. tanners.

CANAIGRE AND WATTLE

There are, obviously, two ways in which we can meet such a situation, that is, either to convert our own vegetable tannin extract industry to new materials which can be grown more rapidly or efficiently harvested, or to create satisfactory artificial tanning agents. Both these courses are now being pursued.

The Department of Agriculture is pushing its program for the development of canaigre—a dock-like plant which can be grown in the arid regions of the southwest and harvested annually. Its roots contain as much as 40 per cent tan, capable of tanning leather as efficiently as other well known tannins. There have been certain technical difficulties encountered, for example, the separation of the tannin from undesirable hemicelluloses, but it is reported that a satisfactory solution of this problem appears to be at hand.

Another, independent project which is receiving considerable attention is the attempt being made to establish a wattle extract industry in California. This wattle tan is produced by a species of quick-growing Acacia originally developed in Australia and later transplanted successfully to South Africa. The California venture visualizes wattle production on currently-unprofitable, marginal land. If successful it may mean that a million acres will be under cultivation within the next twenty years.

SYNTHETIC TANNINS

On the other side of the picture the chemical industry has begun to play its part in providing artificial tans. During the war, one company began research and by the war's end had a product which the leather industry, after a number of critical tests, pronounced as satisfactory, and capable of fully replacing the imported vegetable tans. Another product was also launched by another chemical company based on research at the Tanners Council Laboratory, the University of Cincinnati. These products utilize domestic materials such as phenol, resorcinal, formaldehyde, furfural, sulfuric acid, and sulfite cellulose.

It has been proved by very carefully conducted experiments in the U. S. A. that it is possible to tan every kind of hide and skin into every type of leather with domestic synthetic tanning agents. Moreover, as has been frequently the case in the past with synthetic chemical achievements, the chemist has sometimes improved on natural products. It is admitted today that some types of leathers are being produced which have superior physical properties (e.g., tensile strength, resiliency and color) to those made for many years with the classical vegetable tannins such as oak, hemlock and gambier. It is not too much to say that in another crisis the U. S. could manufacture its full needs of domestic synthetic tanning materials.

MINERAL TANNAGE

The other great branch of the leather industry is mineral tannage (chrome tannage) which is now about sixty years old. This tannage supplies the leather for the uppers of shoes, gloves, mechanical leathers, etc.

In this case also the U. S. is dependent on overseas trade for the supply of this essential mineral tanning agent. Although at one time during the war the supply of chrome threatened to be acute, we weathered the storm but had barely enough chrome to meet our leather requirements.

We have other potential tanning materials that could render us independent—such as iron and aluminum. However, in this case, the technical difficulties have been too great and both tannages cannot be regarded yet as satisfactory substitutes for chrome.

In chrome tanning itself, interest has been revived in the old theory of using "masking agents" and the use of sodium formate has been described and discussed. The use of these materials enables the tanner to utilize more efficiently the chromium which he presents to the hides and the skins. Quite a number of masking agents have been suggested and reports are that they are being used in foreign countries. Among such products are the sodium salts of phthalic, adipic, acetic, oxalic, and formic acids. All of these acids are available from domestic sources.

Zirconium tannage continues to hold its unique position and has been, at least in the U. S. A., the only successful new mineral tannage since the invention of chrome tanning. It is by nature a white tannage and is being used today for producing fine white suede leathers for women's shoes. It is not too much to say that in an emergency zirconium could replace chromium tannage quite satisfactorily.

There are some low-grade domestic zirconium ores in this country and during the war one company spent some time investigating several deposits in Wisconsin and Florida and actual tanning materials and leather were made from American zirconium.

NEWER RESINS

There has been further work on the so-called "resin tannages." These are polymeric materials made from such sources as styrene, melamine, and urea. As might be expected in such novel applications for the tanning of leather, considerable technical difficulties have been encountered but progress is being made.

In the finishing of leather the age-old natural plastics, such as casein, albumen, and gelatin, are being substituted by new materials. Important domestic materials of many different types besides nitrocellulose—which came into prominence during the first World War and which is still used—are being used in many places. These are polyacrylates, polyvinyls, and synthetic rubber latex. Here again the synthetic products on occasion produce superior results to the natural products.

The revolution of leather drying—by the "pasting process" (in which instead of drying skins in a wrinkled condition similar to the housewife's domestic "wash" they are pasted out on frames somewhat like the photographer prepares his prints)—is continuing. In the past, natural adhesive products such as starches and gums were used but synthetic products have begun to appear in this field. Among these are alkylated celluloses, especially methylcellulose and sodium salts of poly acids, such as polyacrylic acids.

Leather making, one of the oldest of the world's crafts, is keeping in step with the newer industries through the application of synthetic's research, mechanical and chemical progress. The modern tannery is as well-organized a factory as can be found in any industry.

There is every reason to believe that the tanning industry will progress measurably, and steadily, in the ensuing years.

TEXTILE CHEMICALS

by DONALD H. POWERS,
Textile Chemicals Dept.,
Monsanto Chemical Co.

WITHIN the past year there have been a great many readjustments in the textile industry. For the first time, many mills discovered that there was not an endless demand for any fabrics that they could produce. In some cases the change came rather abruptly and suddenly, particularly in the woolen industry.

With this decrease in demand for fabrics of any type, attention was turned to the development of better materials. Particular interest involving the use of chemicals on fabrics was shown along five lines.

FIREPROOFING

While some legislation was passed in some states prohibiting the sale of flammable fabrics without adequate labeling, it has not been possible to enforce these laws because of a question as to the best method of testing a fabric and of determining when fabrics are truly flammable. A lot of work has been done, and there is still need for an easily-applied, durable fireproofing agent. The urea-phosphate and vinyl chloride solutions still show the most promise in the durable field, but they tend to decrease the strength or impair the hand of the goods. While the pressure seems to be eased in the demand for fireproofed fabrics, a severe hotel or resort fire would bring back the problem with renewed importance.

There has been a great deal of research work done on washable woolens, both in this country and abroad—particularly in England and Australia. This year is seeing the culmination of this work in the production of large volumes of fabrics. Two types of processes are getting the most attention: the chlorination of the wool to destroy its scale and prevent its felting, and the impregnation of the woolen fabric with monomeric melamine resins which are subsequently polymerized to impart a backbone or stability to the goods and consequent resistance to felting and shrinking. This development appears to be well under way in the hosiery field, is getting into the shirting and sportswear field, and is opening up the children's wear field.

SHRINKAGE CONTROL

This development had a great deal of attention during the year. The controlled causticization of rayon fabrics has given spun rayon fabrics with greatly improved washability, and the condensation of cellulose rayon with glyoxal in the presence of strongly acid catalyst gives a fiber with much lower water pickup, decreased swelling, and far greater stability to washing. The basic problem is the careful control of the condensation to avoid embrittlement and tendering of the cellulose chain. In this connection, the structure of cellulose has had a great deal of study to further clarify the relations between the amorphous and crystalline portions and the effect of chemicals and swelling agents on the fibers.

A novel specialty has been the development of so-called metallic fibers. Actually, this is not spun metal yarns, but rather sheets of thin aluminum foil pressed between two thin sheets of cellulose acetate and then cut into extremely narrow ribbons. This gives a non-tarnishing, lustrous ribbon and is finding a wide, rapidly growing market for special high-style fabrics. So far, no economical method has been developed for producing extremely fine metal fibers or wires.

NON-WOVEN FABRICS

Non-woven fabrics continue to grow in interest and variety. Their preparation has been widened to include the processes involving (a) the parchmentizing or insolubilizing of the fibers to make a solid sheet; (b) the cementing of the fibers with a plastic or adhesive, in emulsion or solution form; (c) the blending of plastic and non-plastic fibers and heating to obtain a continuous sheet.

While non-woven fabrics have not reached the position of being a serious competitor of fabrics in the volume markets, they are developing for themselves a place in the specialty field far superior to paper and are approaching the properties and qualities of lightweight fabrics.

RUBBER CHEMICALS

by HARRY L. FISHER,
Director of Organic Research,
U. S. Industrial Chemicals, Inc.

FIGURES CAN tell a good story. Here are a few about the rubber industry: The consumption of natural and synthetic rubbers in the United States during 1946 amounted to 1,034,190 long tons, an increase of 29.43% over the 799,009 tons consumed during the previous year. The consumption of natural rubber increased 163.27% in 1946, totaling 277,562 long tons, as compared with 105,429 long tons in 1945. The consumption of synthetic rubber in 1946 totaled 756,628 long tons, an increase of 9.09% over the 693,580 tons consumed during 1945.

During 1946 synthetic rubber was consumed in the following proportions: 626,960 tons of GR-S; 44,420 of neoprene (GR-M); 79,224 of Butyl (GR-I); and 6,024 of nitrile rubbers (GR-A, Butaprene N, Chemigum N and Hycar OR). Reclaimed rubber consumption in 1946 increased 14.30% over that of the previous year, from 241,036 to 275,497 tons.

A CHANGING PICTURE

An economic survey indicates that tire production in 1947 will be approximately the same as in 1946, when 82,013,412 units —an all-time high—were manufactured, and that the production of other rubber goods will be even greater than in 1946. Natural rubber is coming into this country in ever increasing amounts and, therefore, the amount of synthetic rubber produced, chiefly GR-S, will be less than in 1946. Correspondingly, the amounts of chemicals used in the manufacture of GR-S and in the fabrication of finished products from it will also be less. These include not only the main constituents, butadiene and styrene, but also soaps, peroxides, mercaptans, stopping agents, coagulants, and antioxidants. In fact, the proportion of antioxidant has already been reduced from 1.5 per cent to 1.25 per cent because of its

limited availability, even in the GR-S now being manufactured. The production of Butyl is slowly being increased and the production of neoprene is about the same as heretofore. Specialty synthetic rubbers are holding their own positions and slowly increasing. There has been an extension of Government authority in the manufacture and sale of synthetic rubbers and in continuing research in synthetic rubbers until such time as legislation is enacted to establish a permanent national rubber defense policy. Controls provided by Rubber Order R-1 apply to allocation, consumption and inventories of rubber, specifications for rubber products, and to importation of rubber products.

NATURAL AND SYNTHETIC

Bus and truck tires can now be made entirely of natural rubber and Butyl is permissible for all inner tubes. GR-S has desirable dampening characteristics and superior heat resistance over natural rubber and therefore will be used in automotive shear and compression mounts in some 1948 cars. It has been announced that GR-S prepared at low temperatures is equivalent to natural rubber in many important properties.

Government large scale pilot plants continue to produce experimental polymers for special trials on a factory scale. These are varied for different purposes, having different outstanding properties, such as low-water absorption, increased viscosity stabilty, better tack, non-staining and non-discoloring characteristics, lower plasticity for extrusion and for sponge rubber, and better heat resistance.

Experimental master batches are regularly being made by incorporation of carbon black, clay, zinc oxide and other ingredients in the GR-S latex before coagulation. These preparations are said to show better processing and handling than when the ingredients are incorporated on a mill. GR-S-10, made with a modified rosin soap and claimed to have better tack and greater resistance to wear, is now being made by the continuous polymerization process. New polymers and copolymers containing isoprene as the chief ingredient are being made for use in regular rubber products and especially as starting products for certain rubber derivatives like the hydrochloride. In the wire and cable industry GR-S is being used for 45 to 95% of the total rubber, depending upon the type of product.

FABRIC DEVELOPMENTS

New products increase the use of natural and synthetic rubbers and the chemicals used in their make-up and fabrication. A new tubeless tire embodies rayon cord construction and combines the safety features of puncture-sealing inner tubes with improved riding qualities, bruise resistance and remarkable ability to retain air pressure. An airplane tire having an eight-ply all-nylon carcass is being manufactured that carries 175 pounds of air pressure required where the weight is great and the space is limited for retracting wheels in flight. Tires with wire cord construction have sustained strength under high temperatures, negligible stretch under load, and ability to dissipate heat away from vulnerable points. Tractor trailer wire cord tires have given up to 103,000 miles with their original treads. Glass cord fabric is being used in experimental tires, in which it has shown excellent strength and resistance to heat. Spun glass yarn imparts high heat resistance to an industrial hose for fighting stubborn refinery and oil well fires with live steam. It is capable of carrying 200 pounds pressure of saturated steam at 386°F. for more than 300 hours under continuous flexing. A new method of radiant heating employs electrically conducting sheet rubber layers of plastic-impregnated fabric.

SILICONE RUBBERS

The new silicone rubbers are practically unaffected over a temperature range of —55° to +520°F., also are highly chemical and moisture resistant and provide good electrical insulation.

New and modified forms of carbon black give more efficient and cooler running carcasses and show greater resistance to tread cracking. A white reinforcing agent, fumed silica, called "white soot," has been developed. Alkylphenolic resins are useful as tackifying agents for GR-S, and synthetic resins and cyclized rubber resins are used as stiffening and reinforcing agents in rubber compounding. A new chlorinated synthetic rubber is characterized by greater flexibility and toughness than ordinary commercial chlorinated rubber.

Latices of all the important synthetic rubbers as well as natural rubber and of reclaimed rubber are continuing in high consumption. Greater amounts of GR-S latices are being used than were used of natural rubber before the war. All this means an increase in the consumption of ammonia, stabilizing agents, and compounding ingredients.

PROSPECTS

The price of natural rubber is dropping. GR-S can be produced at 15-17¢ lb., including all costs and a modest profit, and improvements are being made constantly The price of natural rubber will probably remain above that of GR-S, depending on availability of labor in the Far East, political developments and government regulations. However, it may drop below because 50% of the rubber trees are native-owned and a labor pool may help to keep costs down; also, high yielding trees planted or bud-grafted before the war are now ready for tapping. The price outcome is difficult to predict.

PULP AND PAPER CHEMICALS

by EDWARD N. POOR,
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American Cyanamid Co.

THE rapid expansion of the pulp and paper industry in this country has been one of the largest contributing factors to the growth of the American chemical industry. An idea of the extent of this expansion can be readily perceived from the fact that, whereas paper originated in this country 200 or more years after its inception in all other major countries, we now consume a full 80 per cent of world production. This growth has been made possible only through the use of many and varied types of chemicals.

The purpose of this brief article, therefore, is to indicate trends which appear to be developing within the industry and to describe the use of a number of chemicals of diversified natures.

RECENT TRENDS

There are two rather significant practices in the industry which, although not new, highlight definite trends. These are the extensive development and increasing use of machine coating and the semi-chemical pulping process. Machine coating, as the name indicates, is the coating of paper on the paper machine during its manufacture, as opposed to coating as a separate operation after the paper is made. Semi-chemical pulping consists of mild chemical and mechanical refining of pulp and is of particular importance in wood conservation since it gives higher yields than those of full chemical pulps and is effective with hardwoods.

There are also two relatively recent developments which appear to be gaining wider acceptance. These are the use of synthetic resins and the peroxide bleaching of groundwood pulp.

As these four factors become greater in scope it is probable that the overall chemical consumption picture in the paper industry will be materially affected.

Salt cake, the chief component of the cooking liquor used in the sulfate or kraft process, is one of the industry's most important raw materials. This type of pulping process has grown tremendously in the past few years and now occupies a position of real importance in the pulp and paper industry. Unfortunately the supply situation on salt cake has continued to be tight. Early

this year no significant tonnage was available in the U. S., and unless additional supplies are received from Canada or Chile a serious situation may result.

Casein finds many uses in paper manufacture. It serves as a coating and general adhesive; as a protective colloid in rosin size; as a "surface size" for special papers, and as a waterproofing agent with hardening materials. In recent years casein has been difficult to obtain, and price levels have been high. This fact has encouraged the use of other proteinaceous substitutes. However there are indications that domestic output of casein will be boosted this year and quotations will be shaded accordingly.

STARCHES AND GLUE

The starches used by papermakers are mainly tapioca and corn. Used in the converted or oxidized form, they are the chief materials for "surface sizing" of paper. Starches also find a market for internal treatment of paper, usually in raw form, for strength-improvement, and as a general and coating adhesive. Needs for starch still outrun supply and the prospects of any real improvement in the situation are not encounraging.

The demand for animal glue is likewise far greater than producers' ability to supply. This shortage has led to the introduction of some substitutes, but, in general, the uses continue as in pre-war.

Sodium silicate has, of course, many uses in the paper industry. It is valuable as a sizing agent, in water softening, de-inking, water treatment, for the control of corrosion, in pulping rope and rag stock, coating fiberboard, and as an adhesive. A recently developed use, which is attracting considerable attention, is its employment in conjunction with sodium peroxide for groundwood bleaching.

ALUM

Papermakers' alum (aluminum sulfate) has many uses in the paper industry and is considered by some to be a panacea. Actually, paper producers are the largest consumers of alum and its properties render it valuable as a precipitant for rosin and wax sizes; as a mordant; to improve retention of fillers and glues; to improve the strength of paper and for raw and process water treatment. Consumption of alum continues at full plant capacity and the odds are that this condition will obtain throughout the remainder of the year.

The consumption of wax sizes has been greatly influenced by the rosin market, since, during rosin shortages, wax was substituted for part of rosin requirements. Many consumers, in using wax to extend scarce rosin, found that economic benefits were possible and furthermore that certain desirable physical properties were obtained. As a result a larger tonnage of wax is being used in paper production.

Synthetic resins, too, are being readily accepted by papermakers, for they impart unusual and desirable properties such as wet strength, wearability, etc., to the paper. The acrylics are enjoying popularity for improving tear resistance as well as in coatings where the ultimate in ultra-violet light resistance and durability are required. Urea-formaldehyde resins are being used to improve the pick characteristics of printing papers. No significant improvement in the supply position of acrylics, alkyds, urea and melamine formaldehyde resins is anticipated until late in 1947 at the earliest.

The quantity of sodium peroxide consumed for groundwood bleaching has expanded considerably and a still greater expansion is in prospect. Peroxide groundwood, with its high bulk, opacity, improved brightness and cleanliness, good printing qualities and low cost can be used with both technical and economic advantages in the production of a wide range of papers. Too, studies on the recovery of stock in the bleaching process show little or no weight loss, that is less than 1 per cent.

PROTECTIVE COATINGS

by GEORGE M. SUTHEIM,
Chief Chemist,
Atlantic Calsomine Co., Inc.

BROADLY speaking, the manufacture of paints has gone through three stages of development:

In the first stage, which dates back to the very origin of mankind, when primitive men decorated their home-caverns with pictures of bisons and mammoths, anything that had color and some adhesion to the coated surface was used indiscriminately as paint; for instance, animal blood, milk and perhaps some oils, mixed with natural earths.

In the second stage, keen observers found that certain materials which Nature offers us, can be considerably improved by simple operations, such as heating, blowing with air, or blending with other ingredients. The resulting paints were decidedly superior.

In the third stage, chemists and physicists set out, systematically, to do *better than Nature*. The idea was to take apart the raw materials that Nature provides, to find out what makes them work, and to recombine them, with or without new constituents; or even to start from scratch by building up entirely new molecules.

We are, at present, in the early infancy of the third stage (though some people of our days still stick to period two).

DRYING OIL PROGRESS

As a good example we may look at the present trends in the field of drying oils. Much research has been conducted in this field during recent years and real progress has been made. A consideration of such developments will cast light on the shape of things to come in the paint industry. Natural drying oils, like linseed, tung, or soyabean oil, are still the most important raw materials for all industries that use drying oil. In spite of many inherent shortcomings these oils are and will be used, due to the fact that the supply is inexhaustible. As long as the sun shines and farmers work in the field, a new crop of these oils will become available every year. Coal and petroleum, on the other hand, the source of most of our synthetics, are commodities of dwindling supply which cannot be replaced.

What we call drying oils, linseed oil for instance, merits this name only if very mild standards are applied. Raw linseed oil dries, it is true, but it takes many days or weeks before a solid film is produced, and this film is soft and sticky, rather dark in color, and it swells when immersed in water. Paints made of raw drying oils show all these defaults. As mentioned before, considerable improvements can be achieved by cooking, bleaching and blowing the raw oils and by blending them with hard resins and drying accelerating catalysts. But the inherent shortcomings of the natural oils are not cured by doing so.

As it is well known by now, the natural drying oils are mixed glycerol esters of several fatty acids. Their value as drying oils depends upon the types of fatty acids present. Saturated fatty acids impart no drying value at all. Unsaturated groups, i.e., double bonds, must be present in order to give the oil the quality of drying. Single double bonds, or two isolated double bonds furnish oils which still dry rather poorly. Yet, if the double bonds are favorably located in so-called conjugated positions, then the oil is truly of the drying type. Conjugated double bonds, as well as any other group within the molecule capable of serving as a link between individual molecules, are called "functional groups." It is, thus, the number and the location of functional groups which count. None of the natural drying oils is ideal in this respect.

TUNG

The king of the natural drying oils is China wood oil (tung oil); the fatty acid it is predominantly composed of, eleostearic acid, contains three double bonds in conjugated position. Oiticica oil is almost as good; its main constituent, licanic acid, has the same number of functional groups. Yet both oils contain a varying amount of other fatty acids of no or little drying value. Linseed oil, the

most widely used drying oil, shows a much less favorable composition. Its fatty acids, linoleic and linolenic acid, have two, resp. three double bonds but not in the right position; saturated and unsaturated acids of low value are also present. Soyabean oil is still worse off in this respect.

NEW METHODS

The present trends to produce drying oils, superior to natural oils, are the following:

(1) Segregation: This method separates in natural drying oils the constituents with favorable drying qualities from those which have no or little drying value. Consequently, poorly drying or drying retarding portions are eliminated. (Segregation or Fractionation) Segregated oils are superior to the original oil but, of course, they will not dry any better than the best drying constituents of the natural oil used for their production.

(2) Promotion of new functional groups: Oils of little or no drying value, i.e., those which are deficient in functional groups, can be transformed into oils of satisfactory drying qualities by certain chemical reactions which promote new functional groups in the hydrocarbon portion of the molecule. As examples we may take:

(a) Isomerisation: Fatty acids which contain two or more isolated double bonds can be induced—with the help of catalysts—to perform a shift of these double bonds into conjugated positions. The rearrangement takes place without any change in molecular weight, i.e., the newly created fatty acid is an isomer of the original acid. 9,12-linoleic acid, a constituent of many poorly drying oils, can be isomerized to the conjugated 10,12-linoleic acid which yields oils of vastly superior drying properties.

(b) Dehydration: By splitting one molecule of H_2O out of an unsaturated fatty acid which contains an OH group, such as ricinoleic acid, the main constituent of castor oil, a new acid with an additional double bond is promoted. The corresponding oil—dehydrated castor oil shows very favorable drying qualities.

Both examples (a) and (b) create new functional groups of precisely the same type which occurs in high grade natural drying oils, namely conjugated double bonds in the hydrocarbon chain. The following example (c) is different in this respect; nothing similar occurs in Nature.

MALEATED OILS

(c) Maleation: Reacting fatty acids (and oils) with maleic anhydride is one of several possible methods to introduce new functional groups into oils deficient in this respect. The so-called "maleated oils" are considerably improved in drying and bodying properties; they are truly new substances, deviating very definitely from the natural model.

(3) Introduction of alcohols of higher functionality: The underlying principle of this method is one of structural chemistry. All natural fats and oils are esters of glycerol which is an alcohol with three OH groups capable of reacting (i.e., functional). Yet there are synthetic alcohols of higher functionality available, such as pentaerythritol (4-functional), dipentaerythritol, mannitol, sorbitol (6-functional), etc. The higher the functionality of the polyvalent alcohol, the more fatty acid chains can be linked together in one molecule and, as a result, oils of correspondingly higher functionality are produced which dry and polymerize better. No such oil ever occurs in Nature; yet, chemically speaking, it is still a fatty acid ester of a polyvalent alcohol and, thus something like a second cousin of the natural oils.

PETROLEUM DERIVATIVES

(4) Oils prepared from other natural sources: The various members of this group depart still further from the structural principles of the natural drying oils of vegetable or animal origin. Unsaturated compounds from various natural sources, with or without further chemical treatment, show drying properties as such, or when esterified with glycerol or other alcohols. The most promising source is petroleum, from which highly unsaturated hydrocarbons, acids and all sorts of other little known compounds can be separated. These so-called "petroleum drying oils" are generally inferior to good grades of natural drying oils; they are darker and slower in drying. Yet, in times of shortage, they represent interesting substitutes, available in abundant quantities and rather cheap in price.

SYNTHETICS

(5) Fully synthetic oils: An oil merits the name synthetic only, if its molecules are built up from scratch, i.e., from inorganic or low organic building stones, without the use of fatty acids of natural origin. Such oils can be synthesized according to two different principles: (a) the pattern indicated by Nature is followed; i.e., purely synthetic fatty acids are esterified with synthetic polyvalent alcohols.

Modern methods of preparative chemistry permit synthesis of such fatty acids almost at will; chain length, number and distribution of double bonds can be systematically varied, side chains and other groups can be attached until every thinkable variation is prepared and its properties evaluated. Yet, these syntheses are complicated and expensive and, at present, there is little chance for the synthetic copies of natural oils to compete economically with their natural relatives.

(b) The pattern indicated by Nature is discarded. The property of drying and polymerizing is certainly not limited to the peculiar ester-structure, invariably found in natural drying oils. Other structures, with functional groups of the right type and properly located in sufficient number, may do at least as good a job as the natural model. In fact, synthetic oils have been created, polybutadienes, polystyrenes or other polymers and copolymers, which are no longer esters at all. They are polymers of relatively low molecular weight, i.e., polymers in which the polymerization has been interrupted in an early stage, so that further polymerization may take place when these oils are exposed to the air, heated, or compounded with appropriate catalysts.

(6) Oil-modified alkyd resins: In all examples described up to this point, the finished product was an oil of the drying type with all the typical properties of this group. There are, however, other ways of using natural oils of the slow- or non-drying type for the production of high grade coatings, namely by building the fatty acid into a complex molecule which can no longer be looked at as an oil. The finished product of this type is (not quite correctly) called a synthetic resin, the most important being the so-called alkyd resins. These resins are built up from three groups of constituents, a di-basic acid, such as phthalic acid, a polyvalent alcohol, such as glycerol and a fatty acid, such as linseed or soyabean fatty acid. The fatty acid of natural origin is, thus, a major constituent of these resins. The oil-modified alkyds belong, at present, to the finest and most important raw materials for paints, varnishes and lacquers.

PROSPECTS

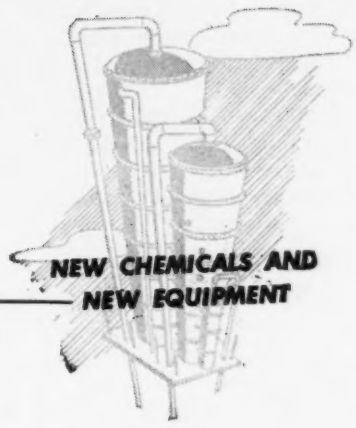
In many other fields of organic technology quite similar trends can be observed, of course with some variations as to details. Natural resins, plantation rubber, animal and vegetable fibres, etc., are replaced to an ever increasing degree by their man-made (or, at least, man-improved) counterparts. At first, natural raw materials showed man how a job can be done. But, in the course of time, never-satisfied scientists became aware of numerous deficiencies of Nature's products. No doubt, natural raw materials are hardly ever ideal. If satisfactory in one or several respects, they invariably carry some highly undesirable properties. Moreover, they vary in composition, their growth may depend upon a certain climate and soil, and their prices undergo severe fluctuations.

If, in the early days of chemical technology, the goal was to improve on natural raw material, our goal today is somewhat higher. The natural model is no longer looked upon as the one possible solution.

It is the scientist's constant eadeavor to do better than Nature, and little he cares if he arrives at his better solution by abandoning the principles along which Nature works.

Turbo-Mixer in penicillin fermenter at Cutter Laboratories, Berkeley, Cal.

EQUIPMENT MAKERS COPE WITH EXPANSION NEEDS

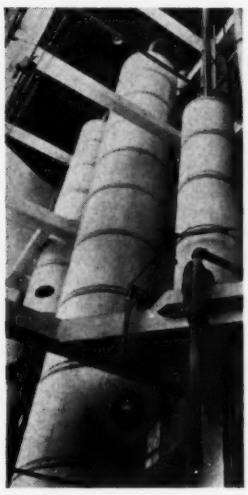


NEW CHEMICALS AND NEW EQUIPMENT

• THE GREAT PRESSURE for a high rate of production, which the equipment manufacturers have been laboring under since the beginning of the War, seems to have abated little, if any. However, the supply situation is not as chaotic as it was a few months ago, as witnessed by the decreased demand for escalator clauses on purchase orders.

Note should be made of a number of new developments in the design of distillation equipment, resulting from recent studies of tray hydraulics, and the developments that have taken place in the design of both low and high temperature heat exchangers. Introduction of new designs of control instruments continues apace. The improved test facilities recently made available for fundamental studies of drying operations promise improved designs, particularly in the field of spray drying. Initiation of the operation of the first commercial adsorption fractionation unit marks a most important addition to the separation techniques available to the design engineer.

Relief from war and postwar chaos will allow a normal development program to be considered by fabricators for the first time in many years, and a greatly increased number of improvements can be expected over the next biennium.



DISTILLATION, ABSORPTION AND EXTRACTION

by JOHN A. HUFNAGEL,
Hydrocarbon Research, Inc.
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MOST work on distillation or related equipment during the past two years has been to determine "what goes on in a tower." A few new developments have been made; but most recent work has been on tray hydraulics, study of liquid gradient and its effect on tray operation, efficiency, cap slot action, and similar studies. Much fundamental work on vapor-liquid equilibrium, theory of rectifying columns, and related subjects has been reported. Towers for separating liquid air into oxygen and nitrogen have been developed with highly efficient trays on spacings as small as 1½".

In tower design a trend is apparent in the application of recent intensive studies to design. Very large diameter columns have been built, some with cascade trays, and other types are being designed. Towers now under way indicate that a "cleaner" deck is being used. Attention is being given to the number and arrangement of caps to allow good liquid distribution and, if possible, to reduce the gradient. With a high tray gradient, pressure drop through the cap slots is maintained high enough to prevent backtrapping through the riser. Caps of various shapes are being used, generally for a specific purpose, such as reducing height of vertical liquid "jets." Hold down bars are being eliminated or placed below trays so as not to interfere with liquid flow, and support angles are being carefully placed to reduce interference with vapor cross flow.

A new tray suitable for distillation or absorption has been developed. It is claimed that it will handle more material with less pressure loss and at a higher tray efficiency than a bubble tray. Vapor engages the liquid and the mixture is hurled against a perforated baffle for separation; the liquid running down for recontacting with fresh vapor. Spray towers of several types are being used for distillation, absorption, degasification or humidification. Alcohol is distilled from fermented mash by spraying the mash in several stages in a tower, the alcohol being stripped from the drops by

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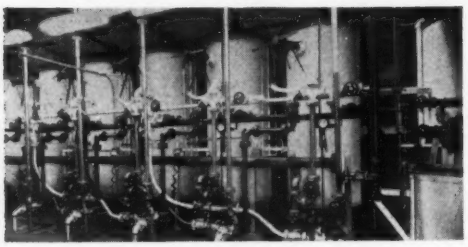
hot vapors. The chief advantage seems to be the low pressure loss resulting, allowing pressures of 10 mm Hg or less at the base of the tower.

Molecular distillation has undergone intensive development. Stills with a 5 foot pot have been reported which handle 50 to 250 gph per unit. Performance is encouraging with efficiencies, per still, as high as 0.95 theoretical molecular plates. Rectification has been introduced into molecular distillation by use of an internally cooled rotating cylinder within a column. The column walls are heated and the material being fractionated is alternately vaporized and condensed, fractionation occurring during each heating and cooling cycle.

Interest in extractive and azeotropic distillation continues high and much work is reported on the properties of systems which can be separated by these means.

Fundamental work has continued in the field of absorption, only one major development being reported. Absorption of vapor from inert gases is being done in a "drop" column and large scale application of this idea is under way. The column operates by forming drops of solvent at the tower top, allowing these to fall a calculated distance before striking a grid where the drop is broken up and reformed. Solvent absorbs the vapor from the inert carrier gas. This tower is claimed to have a high thruput and be generally cheaper to operate and build than an equivalent packed or bubble plate column. The same tower can be used for stripping, humidification, etc.

Interest in extraction and solvent refining continues in the petroleum field and new installations are under way or planned. Purification and recovery of butadiene from a mixture of C_4 and other hydrocarbons is carried out in many plants by dissolving the butadiene in ammonical cuprous acetate solutions. Interest has been shown in liquid—liquid extraction in an open tower; if workable on plant scale equipment, it should effect considerable savings over a packed or plate tower. Solvent treating of vegetable and animal oils has been extended and plants for separation and purification as similar oils are being designed or considered. The centrifugal extractor appears to have preempted the field in the recovery of penicillin and it is also being used for recovery of caffein and other biologicals.



ADSORPTION

by CLYDE BERG,
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Los Angeles, California

ADSORPTION, as a unit process, has become increasingly important during the past biennium. Conventional equipment found considerably expanded uses, and the Hypersorption process, employing a new type of equipment, entered active commercial exploitation with one commercial plant in operation and others in various stages of construction and engineering.

The Hypersorption process employs adsorption to effect close fractionation between components of gaseous mixtures. The essential operation involves contacting of the feed gas stream with a moving bed of activated carbon which has been previously stripped, dehydrated and cooled. Separation of the components of the feed takes place by controlled selective adsorption of the heavier constituents. These are subsequently stripped from the carbon by high temperature steam.

Hypersorption represents a truly basic advance in the unit operation of adsorption raising it from the level of the simple retention of trace constituents to a precision fractionation operation capable of delivering two or three closely fractionated product streams. The units are operated at a variety of pressure levels, and plant capacity ranges into the hundreds of millions of cubic feet of gas per day. Currently, applications of the process under study include the recovery and puri-

ADSORBERS—New Equipment Announced 1946-7

Type of Equipment	*Sizes*	*Construction Material*	*Distinguishing Features*	*Applications*	*Limitations*	*Company*
Demineralizer	3-1000 GPH		Double action type. Four beds. Two complete ion exchange cycles.	Labs and industrial plants for deionized water		Barnstead Still and Sterilizer Co.
Demineralizer			Four columns of alternate anion and cation resins used in series. Removes CO_2 also	Where deionized water is needed	Operates at flow = 60 GPH	American Cyanamid Co.
Demineralizer		Steel	Deionization of water and other liquids. Single package unit. For 110 V plug-in operation	Cheap substitute for distilled water	Max. flow = 1850 GPH	Cochrane Corp.

DISTILLATION AND EXTRACTION—New Equipment Announced 1946-7

Type of Equipment	*Sizes*	*Construction Material*	*Distinguishing Features*	*Applications*	*Limitations*	*Company*
Centrifugal Liquid-Liquid Extractor	100-600 GPH combined stream capacity	18-8 M. type 316, stainless steel where exposed to material	Centrifugal force applied for intimate, multi-stage countercurrent contacting of two liquid phases without emulsion or entrainment. Small hold-up gives high ratio material handled to apparatus weight	Extraction, concentration, purification of penicillin, caffein, vitamins, estogens from liquors	Handles penicillin broth containing up to 1% solids. Max. P = 150 PSI Max. T = 200° F	Podbielniak, Inc.
Gas Absorber	34"	Cast iron, steel, stainless steel, or bronze metals, rubber covered	Fills gap between existing unit sizes; handles up to 800 cfm. of pressure fed gas	Gas absorption on stripping reactions	800 cfm. of pressure fed gas	Turbo-Mixer Corp.
HCl Absorber	Custom built	Permanite shell, Karbate tubes	Small, light, low cost absorber. Makes strong acid from dilute and concentrated HCl (gas)	Making or recovering HCl	Special construction for T greater than 200° F	Maurice A. Knight Co.
Stills and Absorbers	Min. diam = 30". No max.	Carbon steel; 410, 303 stainless steel, monel, aluminum	Cascading type fractionating tray. 50% greater vapor. liquid capacity, less pressure drop than with bubble tray	Rectfiers, etrippers, absorbers		Koch Engineering Co.

fication of ethylene, acetylene, propylene, and methane; the separation of hydrogen and carbon monoxide, CO_2 and nitrogen, and a variety of other separations.

The use of silica gel, as a desiccant, increased greatly as well as that of activated alumina in regenerative dryers. Activated carbon found increasing uses in its conventional applications of air conditioning, water purification, and solvent recovery. Activated carbon was employed on a large commercial scale for the recovery and concentration of the important biological products of penicillin and streptomycin.

The use of ion exchangers to effect separation of ionic constituents continues to expand at a rapid pace.

PUMPS, COMPRESSORS AND EXPANDERS

by JOSEPH F. SKELLY,
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THE post-war period has been marked by a great demand for all kinds of equipment in this field. Swamped by a flood of orders, the fabricators have generally concentrated on the production of stock items for the current plant expansion and reconversion boom. In this they have been encouraged by the engineering and operating companies whose depleted technical staffs have little time to spare for the study and trial of new designs.

As designs and fabricating techniques are further refined, centrifugal compressors find increasing use on large gas volumes at moderate pressures. Even the compression of oil refinery tail gases, long reserved for reciprocating equipment, is now being invaded by centrifugals.

However, in the small and medium sizes, and for pressures above 100 lbs., reciprocating units of standard design are usually installed. In high pressure reciprocating installations there is a trend toward the use of multiple stage units rather than completely separate machines for each stage. When proper consideration is given to standby and space requirements, the multiple stage scheme offers some savings, although control problems are increased.

Probably the leading development in centrifugals has taken place in expansion turbines for deep refrigeration processes. The current interest in large plants for the manufacture of oxygen by air liquefaction has induced a number of fabricators to undertake the development of special turbines for this service. Although design fundamentals are unchanged, many innovations promise improvements in efficiency, maintenance and construction. This work may also lead to advances in turbines for medium and high temperature process applications.

In handling fluidized powders, the standpipe system has proven so satisfactory for overcoming moderate pressure differentials that very little recent work has been done on the development of powder pumps. However, no practical means has yet been found for pump-

PUMPS, COMPRESSORS AND EXPANDERS—New Equipment Announced 1946-7

Type of Equipment	*Sizes*	*Construction Material*	*Distinguishing Features*	*Applications*	*Limitations*	*Company*
Booster-Type Diffusion Pumps, B-6	6" inlet	Stainless steel	High capacity 0.5-100 microns	Dehydration, distillation, impregnation	Limited to high vacuum operations	National Research Corp.
Centrifugal Pump	1½" x 1¼" 2½" x 2"	Aluminum bronze body. Grade 18 replaceable wearing ring. Grade 20 shaft sleeves	Two types—close coupled and pedestal. Machined to develop specific rating. Bearing thrust relieved by hydraulic balance	Chemical, petroleum, food processing industries		Ampco Metal, Inc.
Centrifugal-Standard Pump	1 qt. to 5 gal. per min.	Aluminum	Heavy shaft and deep stuffing box to operate 24 hours a day on chemical service with small flows	Small flow in continuous processing	Head and capacity small	Portable Pump Co.
Diffusion Pumps, H-16	16" inlet	Stainless steel	Extremely high capacity at 0.01-10 microns	Distillation, vacuum furnaces, vacuum coatings, cyclotrons	Limited to high vacuum operations	National Research Corp.
"Pedrifugal" Pump	Three sizes, 10 to 50 G.P.M. up to 100' head	Cast iron, bronze fitted	Affords wide range of capacities by changes in speed through use of sheaves of varying diameters	Large Diesels, machine tools, air contioners, heat exchangers and cooling towers	Can not be used continuously	Allis-Chalmer Mfg. Co.
Self-Priming Centrifugal Pump	¾" suction for 1 qt. to 15 G.P.M.	Stainless steel No. 20	Self-priming pump for unloading drums and carboys		Material of construction	Portable Pump Co.
Pressure Blowers	8' to 20' in diameter	Monel or stainless steel	Blades float in rubber mounting. Pitch may be changed by one adjustment. Blowers assembled with two to eight blades for required pressure or temperture	Cooling towers, air type heat exchangers, mine ventilators	Max. static pressure = 4" W.G.	The Moore Co.

DUST AND LIQUID SEPARATION—New Equipment Announced 1946-7

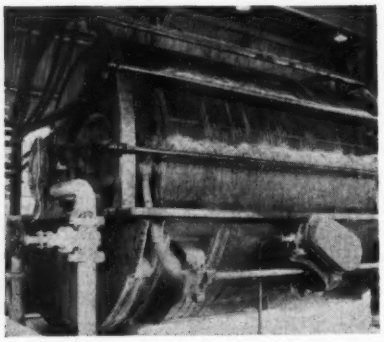
Type of Equipment	*Sizes*	*Construction Material*	*Distinguishing Features*	*Applications*	*Limitations*	*Company*
Air Filter	¼" IPS connections	Brass	Removes oil fog, moisture from instrument supply air	Instrument air lines	For 75 psi supply, 0.5 SCFM flow, press. drop = ½ psi	Moore Products Co.
Liquid-Liquid Separator	Pilot plant, production sizes	Carbon and stainless steels, special alloys	Separate immiscible liquids with variable gravity differentials	Separation of water from organic liquids	Not suitable for liquids with large amounts of surface active materials	Selas Corporation of America

ing large quantities of powder continuously through large pressure differentials.

Several interesting new pumps are now receiving plant trials in chemical and petroleum service. One of these is a packless water-well pump with sectional motor and impeller. Additional sections may be installed to achieve any desired head, while the entire unit remains extremely compact and simple. A Stuffing Boxless pump is also being tried in refinery service. Equipped with a mechanical seal, the drive motor is immersed in the sealing fluid, kept at discharge pressure by a pressure equalizing diaphragm.

Mechanical seals are now being widely applied, particularly in high pressure service, and in the new anti-biotics plants where contamination specifications are unusually severe. The use of Teflon (the new fluorocarbon plastic) has been of great value in many mechanical sealing designs, and its use will certainly increase.

Positive displacement compressors of the Lysholm type continue in active development although they are not yet available as stock items.



FILTRATION

by SHELBY A. MILLER,
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Lawrence, Kansas

THE past two years have witnessed the application of wartime developments to chemical processing generally and resumption of normal peace-time progress in the improvement of equipment and methods. In the field of filtration this has been reflected in modified equipment design, in more versatile materials of construction, and in improved methods of operation.

Although equipment innovations have consisted principally of changes to existing designs, a few new filters have appeared. Among these is the Pur-O-Cel pressure filter, a compact polishing unit intended primarily to replace sand filters for water purification, but adaptable to chemical processing as well. The filter elements of stainless steel or porous alumina carry a precoat of diatomaceous earth. A new micronic filter, the Micro-Klean, has an impregnated-fiber cartridge of graded density to provide increased capacity and longer life. For vacuum filtration, the double-drum design has been extended to permit continuous precoat filtration; the precoat is applied at the bottom of the drums and the slurry is fed to the top. The double-drum vacuum filter also has been modified to perform as a classifier.

Several improvements have been made in vacuum filter designs. One vendor has offered a disc filter with tangential segments to increase the relative pickup cycle; another has devised diagonal drainage channels to reduce filtrate blow-back. Two manufacturers have improved the drainage systems of vacuum-drum filters, one by equalizing the vacuum over the washing and drying cycles to effect more complete liquid removal, and the other by using deep grids to increase the drainage capacity for sugar solutions.

Accessory equipment advances have been made. A new electrically powered hydraulic closing device for filter presses produces a 120-ton thrust and can be operated safely and easily. A proportioning pump has been adapted for the injection of kieselguhr slurry into a prefilt stream.

FILTERS—New Equipment Announced 1946-7

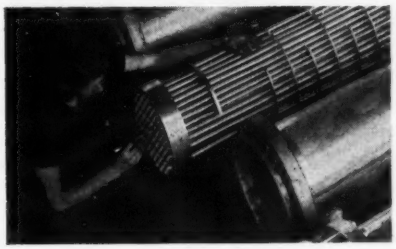
Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications and Limitations*	*Company*
Asbestos Disc Filter	12", 16½" diam.	Bronze, aluminum, stainless steel	Solid, grooved plates; rubber collars	Edible liquids, inedible liquids where brilliance of filtrate is desired. Not for liquids with large quantities of suspended material	Scientific Filter Co.
Asbestos Filter Fiber	8 grades of porosity		A low-iron chrysotile asbestos, chemically treated to remove iron, calcium, magnesium	Sensitive liquids where metallic contamination is detrimental—i.e., wines, whiskeys, pharmaceuticals	Hercules Filter Corp.
Bench Type Filter			Asbestos discs for 8 filtration grades, coarse to ultra-fine; completely enclosed	For light manufacturing or pilot plant work	Alsop Engineering Corp.
Filter Press		Cast iron	Easy removal of cakes with combined plate and frame in one casting	Filtering area = 31 sq. ft.; cake space = 2 cu. ft.	Walter Kidde & Co., Inc.
Filter	50-10,000 GPH	Rubber lined, vitreous enamel-lined, stainless steels	Air wash cleaning device; filter need not be dismantled to be washed		Industrial Filter and Pump Co.
Filter	7'-248' filtering area	Plastic filter cartridges	Occupies 1/20 space needed for conventional sand filters	For swimming pools and industrial water filtration	Bowser, Inc.
Filter Media	Various weaves	Vinyon N yarn	Excellent chemical resistance	Max. T = 120° C	Wellington Sears & Co.
Filtration Equipment		Filter elements of cotton fiber. Containers, screen cores of iron, steel, brass, etc.	Complete line of rubber-lined filters; small lab, single element filter based on 10" filter element, overall size less than 1 cu. ft.; wt. of 15 lbs.; flow rate of 5 GPM.	Wide variety of filtration operations where recovery of fluid desired	Can't be used where fluid has destructive action on cellulose, excessive solids, recovery of solids desired	Commercial Filters Corp.
Heel Leaf for Pressure Filter	Size to conform with tank size used	To match materials used in tank and regular leaves	Heel frame to remove residue in pressure leaf filter at end of cycle; leaf located at bottom of horizontal pressure leaf tanks; easy to remove, clean	Where heel is detrimental, as in varnish and oil plants, chemicals, beverages, foodstuffs	Hercules Filter Corp.
Leaf for Pressure Filter	For tanks in diam. 24"-28"	Lead, steel, stainless steel, monel	Leaf has outer rim, center screen of No. 5 mesh; wire holds various screens, easy to disassemble, needs no bolts to hold back up material	For filtration of highly corrosive chemicals, latices, beverages, foods, industrial waters, varnishes and oils	Hercules Filter Corp.
Portable Filter Press	60 GPH		Small size; high rate of filtration; has Cuno filter in series; built-in relief valve		Buckeye Laboratories
Pressure Filter			Utilizes mats of diatomaceous earth; small size; removes bacteria and amoebic dysentery cysts	Water filtration	Proportioners, Inc.
Pressure Filter	Lab, production sizes	Stainless steel, glass	Permits fine filtering on production basis, without metallic contact	Clarification, polishing, sterilization, fine chemicals, pharmaceuticals. Not adaptable to liquids with heavy sludge	Selas Corp. of America
Replacement Cartridge Filter	1-810 GPH (water) ⅜"-6" Fl. connections	Cast iron; steel; all bronze; all stainless steel	Micro-Klean cartridge element; impregnated fibers prevent channeling.	Wide range of fluids: gasoline, oils, water, chemicals, air, gas. Not available for food processing	Cuno Engineering Corp.

Perhaps the most important application of new materials of construction to filtration equipment has been the further development of chemically-resistant filter media. "Vinyon"* yarn, Type N, extends the temperature threshold of ordinary "Vinyon"* to 120° C. while resisting most acids, bases, and organic solvents. This material, available in semi-commercial quantities for experimental work will not be offered in full supply for some time to come. A manufacturer of string-discharge vacuum filters has developed considerable data on filter cloth of nylon, of the "Vinyon"* yarns, and of other synthetics, resulting in several installations otherwise impracticable for a vacuum filter. The patent literature indicates a future wider use of polymeric materials both as fabrics and as rigid porous media. Applications of sintered metal septa are being extended. Porous stainless steel introduced last year is available now in larger plant assemblies and in standard laboratory filters.

Improved methods include the use of the Lurgi band filter for drying as well as filtering and washing of free-filtering solids; an arrangement for more effective backwashing of porous-stone filters; and a cake-removal technique to allow the use of metal filter media which would otherwise bleed excessively.

* Trade Mark Reg. U. S. Pat. Off.

* Trade Mark Reg. U. S. Pat. Off.



HEAT EXCHANGE

by P. S. OTTEN,
Griscom-Russell Company
New York, New York

IN the production of heat exchangers and in common with many other types of equipment, the past biennium has been devoted to production in an effort to catch up with an almost insatiable demand. In the past this demand has been caused by the increasing prices for fuels of all types, which in turn has instigated a search for a waste B.T.U. to recover. Heat has now become so valuable that there has been somewhat of a concerted effort to recover the heat content of hot solids discharging from kilns and from hot gases, sources formerly considered to be too expensive to handle merely for the recovery of their heat values.

The increasing acceptance of extended surface exchangers is evidenced not only by a larger number of users but by the increased number of suppliers that have started production of this type of exchanger within recent months. In addi-

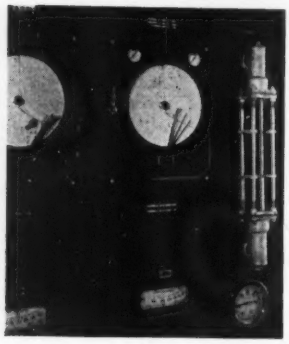
HEAT EXCHANGE—New Equipment Announced 1946-7

Type of Equipment	*Sizes*	*Construction Material*	*Distinguishing Features*	*Applications and Limitations*	*Company*
Combustion Furnace	½" to 1⅜" diam. tubes		Automatic temperature control	Carbon, sulfur determinations in heat resistant steels. Max. T = 3000° F	Harry W. Dietert Co.
Compressed air Cooler	2300 to 2400 CFM air	Steel coil, casing	By evaporative cooling compressed air is brought to temperature lower than ambient dry bulb air temperature, preventing condensation in air lines, tools or process. New manifolding of compressed air improves efficiency.		Niagara Blower Co.
Dewar Flasks	to 50 liters	Stainless steel	Unbreakable, explosion proof, built-in radiation shield	Cold testing, freezing traps, liquid gases, dry ice storage. Not proof against metal dissolving acids	Scientific Glass Apparatus Co.
Dowtherm Preheater	1.5 Kw. to 12 Kw.	Insulated steel pipe body, Chromolox tubulartypeimmersion heater	For heating Dowtherm up to 700° F. Heater equipped with alloy gasket, 150 lb. and 300 lb. forged steel flanges. All welded construction with thermostatic control	Heating jacket process kettles using Dowtherm as heat transfer medium	Edwin L. Wiegand Co.
Electrical Immersion Heater	1 and 2 Kw. in 1" and 1½" diam. Also custom built	Fused quartz shell, Nichrome heating element	Chemically resistant to concentrated, boiling acids. Non-contaminating, direct immersion in solution. Bath temperature automatically controlled	Distillation, fractionation, extraction of acids and solutions. Not resistant to hydrofluoric acid and alkalies	Amersil Co.
Evaporative Condenser	1½ to 7 ton refrig.	Steel coil casing	Evaporative condensation of refrigerant gas with Duopass precooling coil. Prevents deposit of scale. Control maintains uniform operating head pressures	Independent refrigeration systems	Niagara Blower Co.
Geyer Heating Jackets	All flasks to 72 liters	Fiber glass cloth, insulation	Elements at surface for quick heating, close contact.	Heat flasks, bottles, columns, beakers, funnels. Max. T = 400° C	Scientific Glass Apparatus Co.
Heat Exchanger	Heater—up to 155,000BTU. Cooler—Up to 90,000 BTU.	Duriron	Repairs made without shutting down Circulation insures uniform temperature. Weight 145 lbs. Allow vertical or horizontal, series or parallel installation	Heating and cooling wide variety chemical, corrosive and molten solution. Limited strength. Max. steam press = 75 p.s.i.	Duriron Co.
Immersion Heater	100 to 2200 watts	Monel and stabilized steel	Complete alloy construction for screw plug type heater. ½", 1¼", 2" screw plug pipe thread	Heating corrosive solutions where monel or stainless steel are recommended	Edwin L. Wiegand Co.
Immersion Heater	1 Kw. to 15 Kw.	Forged steel pipe flange, alloy or steel Chromolox tubes. Chromolox tubular units	150 lb. or 300 lb. forged steel flange. Silver soldered joints, steel or alloy hairpin shape, gasket suitable for high temperature and pressure	Heating oil, Dowtherm, steam, air and water	Edwin L. Wiegand Co.
Liquid Cooler and Cooker	150 gal. capacity	Contact parts stainless steel, outer case carbon or stainless steel	Use for heating and cooling through valve control. Scraper blade and mixing withstand jacket pressures up to 300 lbs.	Slow agitation processes of viscous materials, with heating and cooling required. Corrosion limitations of type 304 stainless steel	Metal Glass Products Co.
Steam and Air Preheater	1 Kw. to 12 Kw.	Insulated steel pipe body; Chromolox immersion heater	High temperature and pressure steam and air application. All welded construction. Thermostat control	Drying glue corrugated paper, superheating air, heating compressed air	Edwin L. Wiegand Co.
Steam Fan Heater	Custom built	Steel casing, copper coils	Regenerative coil system utilizes latent and sensible heat of steam up to 200 lbs. Vacuum return vapor free. No flashing at low temperature	Large installations where high pressure steam is economical	Niagara Blower Co.
Water Cooling Tower	3 to 8 tons of refrigeration	Steel, welded construction	Enclosed 220-440 volt, 3 phase, 60 cycle AC motor. Compact. Gravity type, fan guard, indoor or outdoor	Air conditioning, food storage, dairies, ice plants	The Marley Co.
Water Cooling Tower	65 to 1580 GPM.	Rough redwood	Natural draft spray tower, Marley spray nozzles. Built-in bays to allow expansion. Atmosphere sections for closed cooling system	Air conditioning, wine industry refrigeration	The Marley Co.

tion to use in water short areas, both the so-called desert areas and those where a high demand has decreased water-availability, they have begun entry into areas where the water supply is plentiful and appear to be gradually closing the gap between the final cost of removing heat by an ordinary shell-and-tube exchanger and the cost of heat removal by an extended surface unit.

A great deal of attention is being paid to the development of efficient exchangers for very high temperature applications such as those encountered in gas turbines and certain types of jet propulsion equipment. At the low end of the temperature scale, increasing attention was paid to the production of oxygen and other materials requiring low temperature processing during the War. This has resulted in the development of numerous special designs, usually using non-ferrous alloy materials, such as the Collins exchanger and various plate exchangers fabricated by pressing a shape and pressing and brazing the sections together. These designs are not only for thermal efficiency but, in the so-called "cheap oxygen units," they serve as accumulators for removing the acetylene, carbon dioxide and water vapor content from the entering air.

The recent increase in the price of coal and other fuels should tend to promote the installation of further heat exchange equipment to improve B.T.U. economy. However, the increased capital costs of the equipment required will do much to reduce this potential economy.



INSTRUMENTATION AND PROCESS CONTROL

by ROBERT W. CERMAK,
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Midland, Michigan

NEW developments in instruments and process control during the past year have been many and varied.

The use of electronic tubes for amplification, measurement and unbalance detection in null point electrical circuits has continued to increase. Practically all manufacturers of self-balancing instruments now offer electronic types exclusively or to supplement existing lines of mechanically-balanced instruments. These electronic instruments are available for use either with thermocouples or resistance thermometers to give increased speed, sensitivity and accuracy of recording.

An interesting development in temperature measurement has been a force-balance type pneumatic temperature transmitter. The unit utilizes a conventional gas-filled thermal system and has a high speed of response with high sensitivity. Only two systems are required to cover the total range from —150° F. to 800° F. A pneumatic pressure transmitter has been recently announced by this company having total ranges from 0 to 1 up to 0 to 200 pounds per square inch also using the force-balance principle.

In the field of vacuum measurement, one manufacturer has developed a special plug for sealing the mercury in a conventional U-type absolute pressure manometer after evacuation and filling to permit shipment.

A concentric scale mechanical absolute pressure indicator has also been introduced.

In the high vacuum field, several types of absolute pressure recorders are now available utilizing Pirani or ionization type gage as the sensitive elements.

In liquid level controllers interest still centers around the displacement type. Many modifications of the basic type have been made available. Among these are various combinations of side and bottom connections and the addition of automatic reset to the control action. A separate pneumatic transmitter pilot can be installed in the same case as the normal control mechanism with the additon of a level indicating pointer, if desired.

Another maufacture has announced a diaphragm type pneumatic force balance liquid level transmitter for viscous or corrosive liquids and liquids containing solids in open tanks.

Considerable activity has taken place in the field of gas analysis, particularly that of oxygen. One company has announced an oxygen recorder in which the vapors of a special alcohol fuel are added to the gas stream. This mixture is then passed through one thermal conductivity cell, over a heated catalyst-filament where the fuel and oxygen burn, and through a second conductivity cell. The difference in thermal conductivities of the sample before and after burning is an indication of oxygen content.

Another oxygen analyzer recently announced utilizes the paramagnetic property of oxygen for its analysis. Two thermal conductivity cells communicate with the sample chamber, the cells being identical except that one cell is in an intense magnetic field created by a permanent magnet. Oxygen being magnetic is attracted to this cell where it is heated by the filament, partially losing its magnetic property. This gas is then replaced by cooler, more magnetic oxygen. The increased circulation in this cell reduces the filament temperature below that of the filament in the reference cell, unbalancing a conventional Wheatstone bridge.

An interesting development in the field of humidity measurement is a special cell in which asbestos fiber saturated with lithium chloride solution is used as an electrical resistor. As the current heats the solution, water vapor is driven off further concentrating the solution which then increases in resistance and conducts less current. A temperature is reached where the solution vapor pressure is equal to the vapor pressure of water in the air or gas surrounding the cell. The temperature of the cell at this equilibrium point can be translated into wet bulb temperature.

Along this same line continuous dewpoint recorders are now offered which utilize a beam of light reflected from a highly polished surface to a photocell. The surface is gradually cooled by refrigeration until fogging of the surface disperses the beam. Temperature of the surface at that instant is recorded as dewpoint of the gas sample.

AUXILIARIES—New Equipment Announced 1946-7

Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications and Limitations*	*Company*
Steel Caster	For 3½" wheels	Formed steel	Unusual liveliness with thread guard, particularly adapted to light and medium weight load applications		Rapids-Standard, Co.
Tools, Non-Sparking	Full range of hand tools	"S" monel for sand cast tools. "K" monel for cutting and gripping tools	High strength and hardness.	For use in hazardous locations in connection with acetylene, ammonia gas, carbon tetrachloride, natural gas, sodium nitrate, sulphuric acid, turpentine, varnish, hydrogen, and oxygen	Ampco Metal, Inc.

In the field of flow measurement a line of rotameters for the recording and automatic control of extremely minute flows is now available. The unit employs electric impedance bridge transmission with electronic unbalance detection. This manufacturer's standard line of rotameters can now be supplied with an integral pneumatic transmitter magnetically coupled to the float extension rod.

A modification of the rotameter can now be furnished as a recording viscosimeter. Flow through one rotameter is controlled using a viscosity-immune float. A second rotameter in series with the first contains a conventional plumb-bob float which indicates greater flow due to viscous drag and can be calibrated in viscosity units.

Considerable work has been done on diaphragm control valves, particularly in small sizes. Valves are now available having maximum flows as low as .0010 gallons per minute per pound pressure drop. For applications where stuffing box leakage must be eliminated several manufacturers now offer valves having bellows seals. Some improvements have been made in valve positioners for increased valve speed, accuracy of positioning and lessened maintenance.

Control mechanisms have also come in for their share of modernization. In some cases, this has meant only minor design changes or additions to existing mechanisms. In others it has been an entirely new approach involving a completely new design. The end result in each case being the ability to furnish proportional, automatic reset or derivative action in any desired combination, with increased dependability and ease of maintenance.

One company now offers a saddle containing a pressure reducer, pressure gage and manual-automatic switch which normally is part of the instrument, but can be disconnected to allow removal of the instrument case and contents. The saddle remains on the panel board to permit remote manual valve operation.

Another manufacturer has brought out a line of instruments in which the locally mounted recording controller contains a pneumatic transmitter and pneumatic control point setter. A compact panel mounted on the instrument board contains two appropriately calibrated pressure gauges and a pressure reducer. One gage indicates the reducer output or control point setting, the second operated by the pneumatic transmitter mechanism indicates actual temperature, flow, etc.

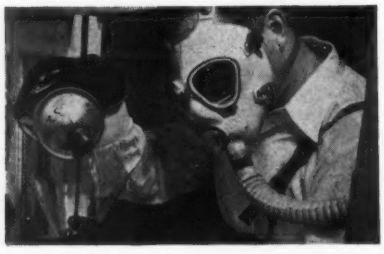
The list of developments given above is, of necessity, incomplete. Other worthy advances have been made and will continue to be made in the future, as the search for new and better instruments and controls continues.

INSTRUMENTATION AND PROCESS CONTROL—New Equipment Announced 1946-7

Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications and Limitations*	*Company*
Adjustable Indexet			Calibrated adjustments to regulate starting position of index motion with reference to controlled air pressure or control index motion for given change in air pressure	To hold process master variable in close limits in presence of variations affecting flow of control agent	Brown Instrument Co.
Air-O-Larm Switch			Pneumatic flapper nozzle mechanism, air-operated mercury switches mounted in explosion-proof housing. Adjustments allow increasing and decreasing values of variable to energize signal system	To energize electrical circuits, solenoid valve, relays wherever departure from critical value is important in process	Brown Instrument Co.
Area Meter	1″ and 2″		Measures viscous fluids volumetrically. Totalizes or averages flow	Installed on vertical axis	Bailey Meter Co.
Belt Conveyor Weigh Meter	To order		Weighs by pressure. Sensitive diaphragms in closed hydraulic system	Weighing coal, paper, ore, powdered chemicals, etc.	Builders-Providence, Inc.
Bin and Tank Level Signal		Stainless steel	More resistant to dust infiltration. High and low signal	Indicates when material reaches probe level. Dry, liquid materials. Static may stop functioning	Mosher Electronic Controls
Controller—Models 50, 55, 56	Output pressures up to 50 psi	Aluminum, stainless steel neoprene diaphragms	Compact assembly of stacked diaphragm units. No levers or other friction producing members	Process control with troublesome lag characteristics. Must be used with primary elements having pneumatic output	Moore Products Co.
Controller, Constant Differential Flow Type	¼″ IPS connections	Brass, neoprene or stainless steel, teflon	Compact unit for control of small flows—gas or liquid		Moore Products Co.
Controller, Differential Pressures		Bronze pilot assembly, semi-steel, bronze or cast steel regulating valves	Air or water operated pilot, non-continuous leak-off	Where differential pressures must be maintained. Adjustable controlled pressure ranges; ½ to 6, 2 to 20, 15 to 75 psi. Controlled differential	Leslie Co.
Controller, Indicating			Continuous measurement with rotating scale and stationary index. Scale read at distances up to 40 feet	Chemical, metallurgical process control, both contact and proportional	Brown Instrument Co.
Controller, Recording-Indicating			Transmits pen movement to a vane governing oscillations in electronic circuit. Interruption results in non-cyclic, snap-action control	Any chemical process wherein pressure or temperature can be electrically controlled	Brown Instrument Co.
Controller, Recording-Proportioning			Bridge circuit between instrument and motor slide wires in conjunction with a relay detects unbalance in circuit	Processes requiring proportioning control of temperature, pH, etc.	Brown Instrument Co.
Differential Relay	¼″ IPS connections	Brass, neoprene, stainless steel	Holds bubbling rate constant	Liquid level or gravity installations. Suitable for air and inert gases	Moore Products Co.
Feed Control	All sizes	Steel	Eliminates critical mechanical relays, electrical adjustment. Resistant to dust infiltration	Pulverizing and process equipment where loading in machine is proportionately reflected in motor	Mosher Electronic Controls
Flow Meter		Steel, stainless steel	Pneumatic transmitter using piston measuring element. Eliminates seal pots—no mercury used	Hot oil flow measurements	Republic Flow Meters Co.
Flow Meter		Steel, stainless steel, monel, aluminum, bronze	Instantaneous range change of 15 to 1 without substitution of parts	Flow measurement where conditions vary a great deal	Republic Flow Meters Co.
Furnace Atmosphere Analyzer			Indicates, records, controls furnace atmospheres	Electronic recorder	Davis Equipment Co.
Helicoid Pressure Gage	4½″, 6″, 8½″ dials		Contains bourdon tube element of K monel. Pressures from 30 to 10,000 P.S.I.	Wide variety of chemicals and corrosive media	American Chain and Cable Co.
Moist-O-Graph			Power unit in conjunction with range selector switch permits moisture measurement of different warps	Textile slasher control	Brown Instrument Co.
Moisture Tester			Titrator shows dead stop at endpoint of determination	Determination of moisture in dehydrated foods. Fisher reagent requires frequent standardization	Wilkins-Anderson Co.
Pyrometer		Cast aluminum housing	Tilted, easily read dial. AN type plug connects to heating jacket	Safe control of heating jackets. Max. T = 405° C	Scientific Glass Apparatus Co.
Pressure Transmitter	1-200 PSI	Stainless steel, monel, brass, phosphor-bronze	High overload protection, replaceable bellows. High speed linear transmission to standard receivers	Liquid level pressure of viscous, corrosive fluids. Available on standard flange 3″ and larger	Moore Products Co.
Radiation Meter	Portable	Aluminum, bakelite	Self-contained batteries. Range from 20-2000 MR/hr. measures beta gamma, X-rays. Differentiates hard and soft radiation	Medical offices, radiology labs, to check radioactive contamination	National Technical Laboratories

INSTRUMENTATION AND PROCESS CONTROL—New Equipment Announced 1946-7 (*Continued*)

Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications and Limitations*		*Company*
Rate Meter		Aluminum	Self-contained batteries, two radio tubes. Meter range 2-20 MR/hr. Records decimal numbers to 3000 random counts/min. Repeats, after 10,000. Plug-in counter tube with beta shield	Geological, mineral surveys for radioactive materials. Traeer element work in lab and industry		National Technical Laboratories
Rigid Extension Thermometer Bulb	Bulb length: 7″-37′ acting portion of bulb: ½″x3½″, ½″x4½″	Stainless steel	Requires no well socket. Bulb deck will not bend under reasonable fluid velocity or pressure. Requires no supporting brackets	Measures T of air, gas, vapor, where bulb is inserted through rotating joints		Brown Instrument Co.
Servo-Control	For motors to 35 HP		Unit applicable to any existing motor-driven machinery. High accuracy—.5-1.75%. Handles 15 amp, 110 V AC; 10 amp, 220 V AC load	Remote control of variable speed transmissions, engines, throttles, etc.		Yardeny Laboratories, Inc.
Temperature Control	110V, 60 cycles, 220 V, 60 cycles	Cast aluminum case	Operates electrically. Enables pyrometer to hold T within 0.2° F	T control within narrow limits	Use in conjunction with pyrometer controller only	Claud S. Gordon Co.
Temperature Control	Max. 15 amps		Utilizes infinite cycle principle. No heat build-up	Temperature control of laboratory appliances		Laboratory Construction Co.
Temperature Regulator	½″, 4″	Bronze, semi-steel body-hardened wearing surfaces	Self-acting, self-contained control. No stuffing box on main valve stem. Rugged, wide range thermostatic element, protected diaphragm	T control of liquids in heating, cooling process tanks	Max. steam P = 125 psi, liquids = 175 psi. Controlled T = 20°-600° F	Leslie Co.
Thermocouple	Tube length hot = 12″-36″ cold = 12″-24″	Silicon carbide	Molten aluminum thermocouple protected by silicon carbide tube gives fast T response. Resistant to molten aluminum	In tilting pot where close T control is important	Does not stand up under mechanical abuse	Brown Instrument Co.



SAFETY

by J. J. HOFFMAN,
Monsanto Chemical Company,
St. Louis, Missouri

THE two year period since the war ended has been marked by numerous changes in safety equipment and devices. These changes are occurring both in types of devices and in the materials used in their construction.

One of the most significant developments during this period is the use of lighter weight materials of construction, such as plastics, and light weight metals. These materials which were practically unobtainable during the war have become available. The old make-shift steel lock-loading-plate which is heavy and unwieldy, and produces more than its share of foot and back injuries, is being rapidly outmoded by a new type loading-plate constructed of magnesium. This type is sufficiently strong, very light and can be easily handled by two men. This same tendency toward light weight and ease of handling is also evident in other types of equipment such as various types of material handling devices, ladders, scaffolding, etc.

Other light weight materials being used to an increasing degree are plastics of various kinds. These materials not only have the advantage of light weight and moldability but also have the marked advantages of transparency and an almost unlimited range of permanent colors. Plastics of various types have been used in the manufacture of protective equipment for some time, however, during the past two years the use of plastics has brought about considerable improvement, particularly in face and eye protective equipment. Goggles, spectacles and face shields made of plastics have been reshaped to provide increased protection, greater field of vision, lighter weight and more comfort to the wearer. Beyond this, the use of plastics in machine guarding is becoming more and more widespread. This is particularly true in point of operation guarding where it is frequently necessary to see just how work is progressing, such as on lathes, shears and power saws.

This trend towards lightness of weight is sure to produce other valuable changes in safety devices. It appears almost certain that, safety equipment, in addition to being light weight, will take on attractiveness of design and painting. This should materially assist the efforts of accident prevention specialists to secure the cooperation of the employees in the wearing of protective equipment and use of safety devices.

SAFETY—New Equipment Announced 1946-7

Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications and Limitations*		*Company*
Combustible Gas Alarm			Locking cover prevents change of controls. Illuminated lettering indicates conditions as they arise. Visible and audible signal in case of current failure or loss of suction. Automatic cut-off of current to analyzer head in case of filament blowout			Davis Emergency Equipment Co.
Dustfoe Respirator	Small, lightweight	Aluminum facepiece, rubber face cushion, plastic filter container	Facepiece adjustable to comfortable fit. Filters visible in plastic container	For protection from toxic and nuisance dusts and mists		Mine Safety Appliances Co.
Fire Fighting Equipment	From small dip tanks, to large storage tanks	Bronze, steel	Provides foam for fighting oil and chemical fire with simplified equipment	For extinguishing fires in all types of flammable liquid tanks		National Foam System, Inc.
Oxygen Breathing Apparatus	Wearing size	Rubber breathing bag, aluminum castings, replaceable canister	Self generating, supplying ample oxygen for all breathing requirements	For emergency or routine entrance into places of noxious air or oxygen deficiency	Approved U. S. Bureau of Standards 45 min. period	Mine Safety Appliances Co.
Redi-Heat Block	Small, light	Magnesium casting	Instant available warming pad for first aid, economically operated, with replaceable cartridge. For treatment of shock	Continuous warmth for one hour		Mine-Safety Appliances Co.
Safety Goggle		Rubber frame, plastic lens	Provides wide angle vision, good ventilation	Protects against chemical splashes, spray, foreign particles		American Optical Co.
Welding Fume Exhauster	Light portable	Sheet metal	Motor drive, electrically operated. Removes toxic welding fumes	Requires 110 volt AC-DC		Mine Safety Appliances Co.

SEDIMENTATION AND CLASSIFICATION

by A. ANABLE,
Dorr Company,
New York, N. Y.

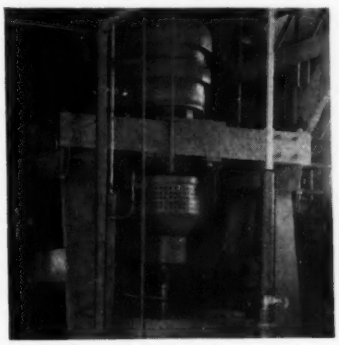
THERE have been comparatively few developments in new designs or new applications of classification and sedimentation equipment during the past two years. Those developments that have been made consist primarily of mechanical improvements to better the performance of existing units or to extend their range of application.

A new clarifier in the 30-100 ft. range has been made more rugged by use of a cylindrical central steel column for feeding; a trussed-frame rake arm construction; longer rake blades and a simpler drive unit.

A new hydroseparator, developed for handling large volumes of coarse granular solids such as phosphate rock, can handle from 100-1000 tons of solids per hour. The three rotating rake arms are rigidly attached to the central drive column with an automatic hydraulic lifting device to raise the rakes as high as three feet in case of an overload.

A new drive unit has been introduced for driving sedimentation units at extremely slow speeds. Instead of the conventional train of gears, a large internal gear, attached to the rotating element, acts as an endless ratchet, driven by four pawls which are extensions of hydraulic pistons. The pistons are so valved that two are always in driving position while two are returning to position for a new contact.

An intercompartment sludge seal has been introduced for tray thickeners of the washing type. This seal, one for each compartment of a multi-tray thickener, permits sludge to pass readily from one compartment to another for countercurrent washing, but effectively prevents solutions from passing. This results in a greater displacement efficiency and an increased efficiency of water utilization.



CENTRIFUGES

by JULIAN C. SMITH,
Cornell University,
Ithaca, N. Y.

THE past few years have seen a great increase in the use of centrifuges in both chemical and other manufacturing. Although no new types have appeared during the last two years, mechanical improvements and use of corrosion-resistant alloys has greatly extended the field of application of existing types. In particular, improvements have been made in batch-automatic and continuous centrifuges, although there have also been significant developments in high-speed separator centrifuges and batch centrifugals.

Improved bowl designs have led to the extensive use of high-speed centrifuges for purifying and dewaxing oil and diesel fuel. They have found application in the manufacture of penicillin and streptomycin. High-speed centrifuges incorporating continuous solids discharge have been much improved, and are finding increasing use in chemical processes and in handling various food products. They appear to be replacing starch tables in the preparation of starch from various grains.

Batch centrifugals with fume-tight enclosures are available for the safe processing of volatile or hazardous solvents. Basket speeds have been increased: several companies now offer 40-inch centrifugals operating at 1800 r.p.m. Two companies have perfected devices which maintain a positive slow basket speed during the unloading operation.

Solid-bowl batch machines are being extensively used for separating small amounts of solids from large amounts of liquid. Solids which build up in the basket are discharged perhaps once a day, providing substantially continuous operation.

The field of appication of batch-automatic centrifuges has long been limited by the fact that many materials could not be discharged satisfactorily. Improved discharge chutes now permit a much broader range of solids to be handled. Fume-tight enclosures have also been developed for this type of centrifuge. A cycle counter is now available which permits giving a screen rinse at any desired number of cycles, instead of on each cycle as before. In one design the spring on the cake leveler has been replaced by hydraulic pressure, giving a constant back pressure on the leveler regardless of its position.

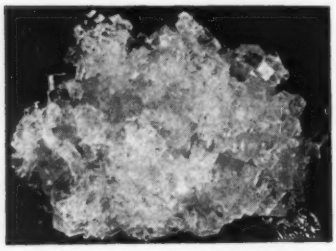
In horizontal screw-conveyor continuous centrifuges the trend is away from slotted-bowl and toward solid-bowl machines. A modified bowl is being developed which is expected to permit handling of solids that could not be conveyed in earlier machines. Conveyor cen-

CENTRIFUGES—New Equipment Announced 1946-7

Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications and Limitations*	*Company*
Automatic Centrifugal		Steel, stainless steels, nickel, monel, and bronze	Fully automatic control	Not suitable for separations requiring over 1000 times gravity	Baker-Perkins, Inc.
Continuous Centrifugal		Steel, stainless steels, nickel, monel, and bronze	Various design improvements	Not suitable for separations requiring over 1000 times gravity	Baker-Perkins, Inc.
Laboratory Center-Slung Centrifugal	12″	Iron, steel, rubber covered, 304, 316 stainless steel, monel	Interchangeable perforate and imperforate baskets. Fume tight cover. Explosion proof motor	Labs, research, pilot plant development work	American Machine and Metals, Inc.
Pilot Plant Centrifugal	20″, 24″	Steel, stainless steel, rubber covering	Interchangeable perforated and solid baskets	Pilot plants, research labs, small commercial operations	Fletcher Works Inc.

trifuges are being used for both lower and higher production rates than before: a small, high-speed machine of this type has been introduced, designed to dewater a few hundred pounds per hour; single large units are dewatering up to 100 tons of solids hourly.

Some improvements developed during the war have not yet been released from secrecy. When these and other developments now underway become available, centrifuges will probably be used more and more to replace filters and other types of separating equipment, which are now in use.



CRYSTALLIZATION

by H. B. CALDWELL,
Swenson Evaporator Company,
New York, N. Y.

DURING the past year, no fundamentally different or new designs of crystallizers have made an appearance. The now well established vacuum crystallizer has gained wider acceptance due to its inherently simple construction and dependable low cost operation.

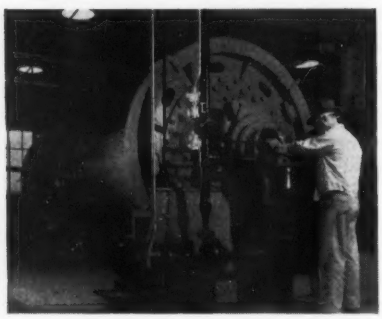
Its largest single application has been in the viscose rayon and cellophane industry where it is used to crystallize Glauber's salt from the acid spin bath and thus permit recovery of the other chemicals in the bath. It has also found application for the crystallization of copperas, chromates, potassium chloride, pentaerythritol, dicyandiamid, nitrates, ammonium sulphate, sodium chloride from strong caustic solutions, zinc sulphate, copper sulphate, and others.

There have been important improvements in the details of design such as simplified and more efficient agitators which result in a more uniform crystal size; improved thermo-compressors which reduce steam consumption and virtually eliminate salting-up of these parts; and better use of materials of construction to overcome contamination of product and corrosion of equipment.

Considerable attention has been directed toward the use of continuous and multi-stage vacuum crystallizers for large tonnage outputs in the interest of still lower overall operating costs. The production of 10 to 20 mesh size crystals is a growing demand and this has been accomplished in some instances by carefully controlling cooling rates. Development work along this line is continuing.

Investigation in Europe after the war has disclosed the use of a few continuous multi-stage vacuum crystallizers having as many as ten stages of steam jet thermo-compression for relatively small productions. It is believed by the writer that such complication and high initial cost is not warranted by the relatively small theoretical saving in operating cost.

It is a certainty that vacuum crystallizers and coolers will continue to be more widely employed. Further improvements probably will be directed toward more positive control of crystal size, their use with organic solvents, and the concentration of heat sensitive solutions by the freezing out of ice crystals.



GRINDING

by S. B. KANOWITZ,
Raymond Pulverizer Division,
Combustion Engineering Co., Inc.,
New York, N. Y.

THERE has been very little development in new types of grinding equipment in the past two years. Manufacturers of pulverizing equipment have been busy filling orders for equipment which had been dammed back by the war. The new types of pulverizers developed during the war period and two years prior to it have been tried out in actual operation and undergone changes in design in an attempt to remedy defects which have shown up.

The new types of pulverizers mentioned above are primarily devices for producing extremely fine products in the sub-sieve sizes. They come under the categories of jet, pneumatic or shear with integral air separation. The main difficulty with most of the pulverizers in these categories is, although they can pulverize a material so that the bulk of it will be under 2-5 microns, there will be a small percentage which will not be below 73 microns. At present the tendency is to operate these units in closed circuit with an air separator to remove the top sizes.

Most recent developments have been improvements in the design of existing equipment and in combinations of the various applications in the chemical industries. It is now possible to combine in one operation drying, calcining, pulverizing and air separating so that in many cases even a very wet sludge containing 70% or more of moisture can be fed to a unit which will continuously deliver a dry, dispersed and air separated product ready for shipment.

GRINDING—New Equipment Announced 1946

Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications and Limitations*	*Company*
Grinder	50, 60, 75, 100 HP	Steel plate	Primary crushing stage built into pulverizer eliminates necessity of auxiliary equipment	Heavy chemical industry	Prater Pulverizer Co.
Hammer Mill	½-200 HP Speeds = 1000-7500 RPM		Ht. = 47″, base = 53″x38″, charge opening = 24″x30″. Discharges by gravity and pneumatic conveying	Heavy duty	Buffalo Hammer Mill Corp.
Hammer Mill Grinder	½-12 tons/hr.	Cast iron, steel	Vertical design, 360° screen enclosure, replaceable hammers		Enterprise Engine and Foundry Co.
Mill		Stainless steel grinding parts	Accessible parts for cleaning when changing from one material to another	Grinding, emulsifying, homogenizing, mixing, dispersing and disintegrating	Morehouse Industries
Pulverizing equipment	2000-8000 lbs. per hour		Large capacity; guaranteed control of particle size	For producing ultra-fine powders (1-25 microns)	Pulverizing Machinery Co.

Great strides have also been made in grinding heat sensitive materials in conditioned atmospheres so that the material can be bagged directly after pulverization. This applies particularly to plastics.

Summing up, no new types of pulverizers embodying a radical change in design have appeared on the market. Most of the time has been spent in improving existing types of pulverizing equipment so that a uniformly pulverized material could be obtained, at the same time taking care to be able to dry or cool the material during grinding to enable operation under all weather conditions.

MIXING

by E. J. LYONS,
Turbo-Mixer Corporation
Unit General American Transportation Corp.
New York, N. Y.

THE recently offered "Speedmuller" is a novel device for the mixing of dry or moist powders. Centrifugal force from rotating plows and horizontally mounted mulling wheels is used to suspend the material and provide the wheel pressure against the tank side wall. A faster blending time is claimed over tumblers or conventional pan type gravitational mullers.

Two recently advertised machines which we have not previously mentioned employ the well-known principles of the high speed disc. One uses variations of the flat disc to promote shear and attrition for the dissolving of viscous materials; another uses a disc curved somewhat like an involute with shallow blades to shear or chew paper into a pulp.

Most of the advances in the last two years have been in accessories. Typical of these, is an air or water cooled stuffing box, which can be bolted on to the tank. This simplifies construction and reduces the installation cost. Another is an adjustable split-type steady bearing. The bearing can be adjusted in place with lock screws to conform to the alignment of the vertical shaft, thereby simplifying assembly of the machine. Disc type seals are being used more widely on mixers. The Duraseal with variations has been used for some time. More recently bellows type seals of simpler construction have been used with success.

Motoreducer deliveries appear to be improving which will reduce the necessity for substituting the more readily available V-belt, or intermediate reducer and motor combination.

Since 1945 the application of new mixer designs in penicillin and streptomycin manufacture has continued. These designs have more recently been extended into allied fermentation fields, where previously air was the only force for mixing of the fermenting material.

A more outstanding example of a new mixer application is demonstrated in the recent plant expansion of one of the large corn starch manufacturers. Because of the thick starch slurries the industry has long standardized on slow moving sweep type paddles to simply keep the slurry suspended as the sweep type could be designed for the large tanks customarily used and turn over the high density starch.

In the new plant centrifugal type mixers have been applied throughout the process with excellent results. The centrifugal type is of simpler construction, and therefore easier to clean and maintain. The improved circulation enables an accurate control of endpoint in the chemical treatment of the starch. This exact control was not previously possible.

MIXERS—New Equipment Announced 1946-7

Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications and Limitations*		*Company*
Agitator	24" to 72"		Axial agitation; agitator shaft may be direct connected to vertical gear head motor, flat or v-belt driven	For vertical flow application	3000 to 20,000 gpm.	D. J. Murray Co.
Batch Mixer	13 to 120 cubic foot capacities		Enclosed drive reduction gear; v-belt drive; air operated cylinders for discharge chute and hopper gate control. Improved mixing blade arrangement.	For mixing glass batches, enamel frit, refractory cements, furnace charges, dry dusty materials, etc.		Ransome Machinery Corp.
Change Can Mixer	150 gal.	Carbon steel	Four speeds and v-belt drive. Speeds from 42-146 RPM.	Liquids and paste mixing	5 HP load. Others to special design Cycle time = 1-4 min.	Allied Steel and Equipment Co.
Ingredient Mixer	6 sizes 3-20 cu. ft.		Employs centrifugal force for milling pressure batch mixes			Beardsley and Piper Co.
Pan-Type Mixer	Capacity to 50 cu. ft.		Mixes, blends, coats, tumbles, polishes, finishes, constant speed. 135° tilt range, remote control	Candy, drug, chemical, food industries		Ransome Machinery Co.
Vertical Mixer	20, 340 qt.	Bowls, beaters of tinned or stainless steel, or as required	Ratio of beater to head speed adjustable while machine operates. Special beaters, whips available		Beater range = 40-320 RPM Head range = 0-160 RPM	American Machine and Foundry Co.

EVAPORATION

by W. D. KOHLINS,
Buflovak Equipment Division,
Blaw-Knox Company,
New York, New York

DURING the past two years commercial use of recompression evaporation has been the only major new development in the design of evaporators. Its practicality for general use has yet to be determined. The Kleinschmidt evaporator, developed during the War to produce potable water from sea water, mechanically compresses the vapor. Although vapor recompression has been used for many years, particularly abroad, this was the first extensive use of mechanical compressors in this country. It is questionable whether this development will find wide application in the chemical field because of the problems of corrosion, boiling point elevations of many solutions and the costs of large size installations particularly where alloy construction must be used.

A plant size recompression evaporator is also being built using a steam jet compressor, with an expected overall economy of 2.14 pounds of water evaporated per pound of steam expected. In this case, however, the solution has a negligible boiling point rise, steel construction is satisfactory and operation will be at atmospheric pressure on the vapor side, excellent conditions for this design.

The increased cost of coal has caused many plants to give further study to the overall steam balance. Evaporators with a large number of effects than utilized before may now often be justified. In addition to use of multiplicity of effects, fuel can be saved by the proper use of heaters. Installations are now being made with liquid to liquid exchangers and vapor heaters where they could not be financially justified a few years ago.

Another development is the wider use of evaporators operating with very low liquor temperatures, in the range of 40-60° F. The manufacture of certain biologicals and foods, the qualities of which are destroyed by higher temperatures, necessitate this type of operation. The high vacua are produced by steam jet "boosters" which discharge to condensers for maintenance of the necessary low pressures in the evaporators. Sub-atmospheric steam is also used to maintain low tube temperatures. In cases where the upper allowable temperature is very limited, forced circulation evaporators are used even though the liquor is not viscous and no salt is produced. This definitely limits the temperature rise through the heating element and gets away from localized overheating and the high temperature rise due to hydrostatic head which may take place in a natural circulation evaporator.

Although very little of a radically new nature has developed in evaporator design during the past two years, there have been many new applications involving special materials of construction and adaptations of existing designs to special problems with different limitations.

DRYING

by J. W. GREENE,
University of Denver,
Denver, Colorado

SINCE the end of the war, many improvements have been made in drying equipment and practices. The trend toward continuous processing has been accelerated because of the marked economies in fuel and labor.

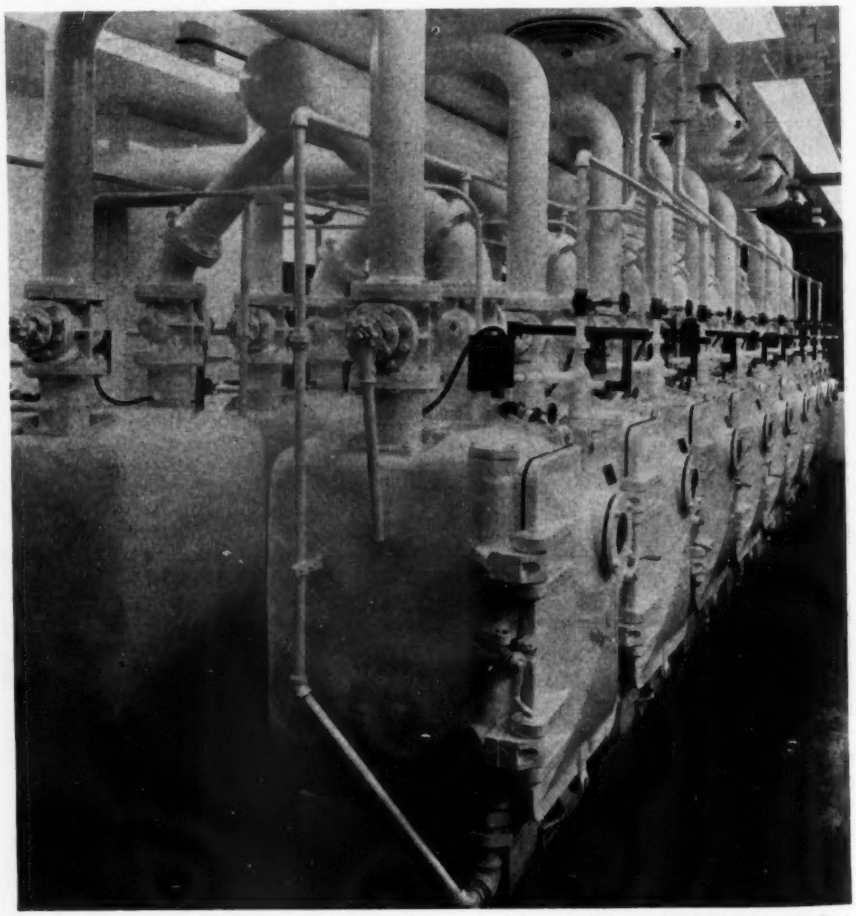
The application of spray drying to a wide variety of materials such as synthetic resins, inorganic chemicals, dyes, detergents and waste products from packing houses, fermentation processes and the pulp and paper industry has been greatly accelerated by the construction of a large scale experimental spray dryer and by the development of a successful laboratory spray drying unit. The very intimate contact between the atomized material and hot air results in a drying time measured in seconds as well as an efficient utilization of the heat in the air. Short exposure to elevated temperatures and rapid cooling of the dried material are making spray drying of heat sensitive materials practical.

Studies have been made of spray wheel design and operation which have aided in the control of the bulk density of the dried product, an important factor in any subsequent packaging operation. Standard spray wheel units are now available in sizes up to 60 H. P. at 20,000 R. P. M.

Improvements have been made in the design of air flow systems in order to reduce the power requirements. This has become more important because of the increased volumes of air handled in the larger units now being installed. Secondary dryers and coolers which were developed for dried eggs and milk have been adapted to other materials with resulting improvements in quality and lowered moisture content.

Commercial "freeze-drying" equipment has been further developed for the dehydration of extremely sensitive products, such as blood plasma, penicillin, streptomycin, and food items. The water is evaporated from the frozen state, the rate of evaporation being sufficient to maintain the temperature below the freezing point. The dried material is in an extremely porous state which promotes rapid solution.

A wide range of mechanical improvements has been made in dryers for the purpose of improving the utilization of heat, the heat transfer, the uniformity of feed and the control of dust. In order to



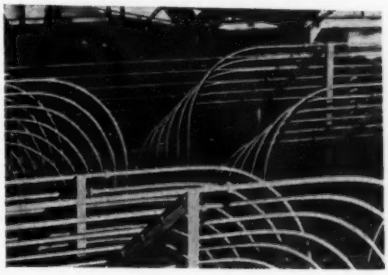
Courtesy National Research Corp.

The drying of solids by sublimation of the volatile material from the frozen state continues to expand at a rapid pace. Drying penicillin at the plant of the Charles Pfizer Co., Brooklyn, N. Y.

reduce heat losses caused by the leakage of hot air several new seals have been developed. A novel design utilizes high volocity jets of air which greatly reduce the drying time and correspondingly increase the capacity.

Automatic controls are being applied to the feed systems so that greater uniformity of product and better thermal efficiency are obtained. A greatly improved feed mechanism which eliminates lumps in finely divided materials, which are to be conveyed by the air stream in a concurrent dryer, has been used successfully.

The most significant advances in drying have been the development and extensive installation of greatly improved test facilities for the accumulation of fundamental data for the design of various types and sizes of dryers. This is becoming of increasing importance since the trend is toward wider application and greatly increased capacity of existing types.



PIPE AND FITTINGS

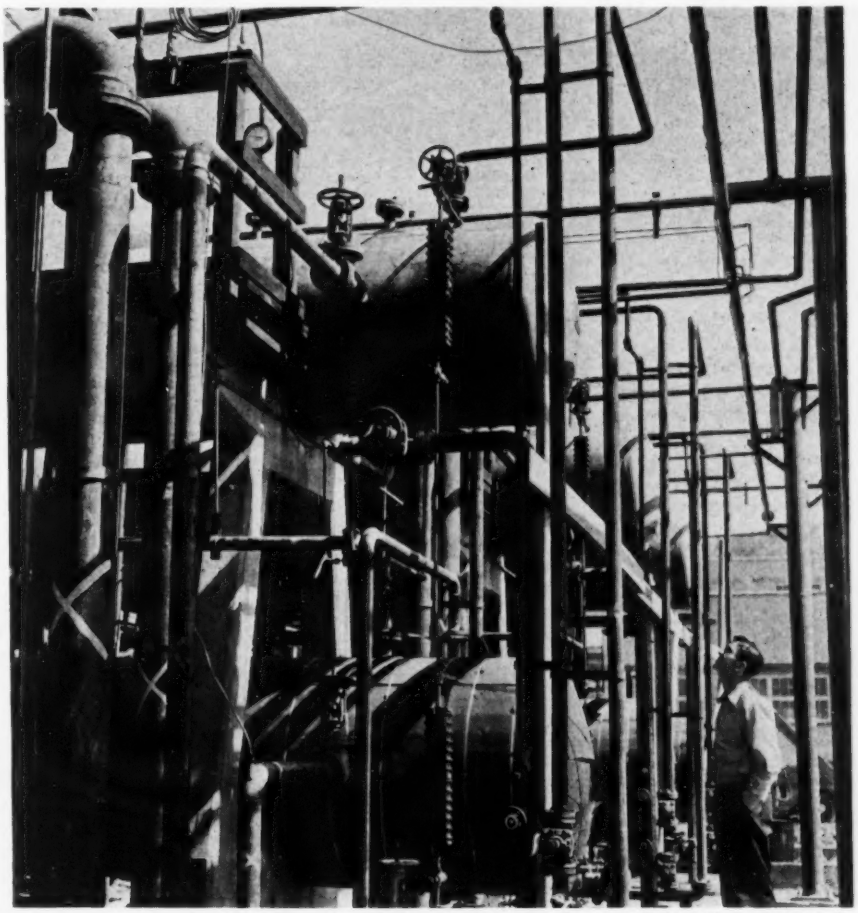
THE ubiquitous pipeline and its appurtenances is so commonplace as to seem insignificant. But the pipeline probably accounts for a larger share of process equipment investment than any other single class of apparatus—it may average somewhere around 30% of the book value of all process equipment. Piping also plays a leading role in process changes and maintenance for very little can be done in most chemical plants without revamping the piping. Thus improvements in piping and fittings, even the minor developments, may add up to a considerable advance in the cost of the whole plant.

During the past two years there has been a continuation of the long term trend toward extending the range of sizes, types and materials of construction for piping apparatus. In fact, this appears to have been the principal activity of the well established suppliers of process industries' piping.

Since the end of the war quite a number of firms not hitherto suppliers of materials to the chemical processing field have offered their wares. Among these are prominent makers of piping for specialized food processing, for automotive, marine and aircraft equipment. Outstanding in this new trend is the increasing interest in tubing and specialized fittings for tubing that make for ease and speed of assembly and dismantling; for greater facility in cleaning.

As always there have been some ingenious new devices. Among these is a pipe leak clamp—a simple device that holds a synthetic rubber pad over a leak to maintain production and safety until more permanent repairs can be made. Another is a porous line filter of stainless steel. The filter element which resembles sintered oilless bearings, is capable of very fine filtration where only traces of solids are to be removed. Still another is a packless, diaphragm control valve for general process use—presumably an adaptation of certain types of expansion valves previously used in specialized refrigeration equipment.

It would be difficult and tedious to discuss each of the worthy new developments in piping apparatus. The important thing is that there is progress—the range of equipment continues to grow; helpful adaptations from other fields are being effected; and, here and there invention solves some old problems in an improved manner.



Courtesy United States Rubber Co.

Pipe and fittings ". . . average around 30% of the book value of all process equipment."

PIPE AND FITTINGS—New Equipment Announced 1946-7

Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications*	*Limitations*	*Company*
A. PIPE LINE STRAINERS Y Strainer	⅛" to 2"	Cadmium plated cast iron or bronze	Corrosion resistance		Cast iron service, 250 psi. Bronze service, 400 psi.	A. W. Cash Valve Mfg. Co.

Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications*	*Limitations*	*Company*
B. COUPLINGS						
Coupling	2½" in future, 1"-4"	Brass, aluminum, stainless steel	"Trip Proof" valve can't be opened till coupling is locked on. Valve must be closed before coupling is disconnected	For liquid loading lines where spillage is important and time valuable	Max. P. = 400 psi.	Roylyn, Inc.
Coupling	2¼" to 5" long	Molded synthetic rubber	Maximum flexibility; can't fall off; quick assembly; no metal to metal contact	Machines needing flexibility		Lovejoy Flexible Coupling Co.
Flareless Fitting	¼" to 1"	Steel	Eliminates need for flaring and assembly tools, brazing, and soldering	Join all hydraulic and fluid conveying metal tubing		Parker Appliance Co.
Flanged Conical End Fitting	11 sizes 1" to 10"	Stainless steel	Streamline, light weight, low cost, flush joint easily assembled, pressure and vacuum types	Alcoholic beverages, batteries, chemicals, cosmetics, foods, oils, soaps, rubber products, plastics, pet. and met. prods.	250 psi and above	Tri-Clover Machine Co.
Fitting, Light Gage	15 sizes 1" to 18"	Stainless steel	Butt weld, light weight, streamline, pocketless	"	Very high pressures, demountable installations	Tri-Clover Machine Co.
Fitting		Stainless steel	Permits use of stainless steel tubing in stainless steel piping systems, and take off systems	For conveying gas		Electric Steel Foundry
Flexible Pipe Coupling	7 sizes 1¼" to 6"	Butyl, and buna-N rubber	Special platings (zinc, tin, cadmium) for special uses. Use on plain end pipe, or old pipe. Quick action	Wide fluid use, acids, alkalis, solvents, steam, etc.	Pressures above 350 psi.	Drinkwater, Inc.
High Pressure Hose Couplings	½" and ¾"	Bronze and brass	Full flow, streamline, remountable, internal expansion, high pressure	Where a vibration absorptive, high pressure hose is needed		Bar-Way Mfg. Co.
Hose Coupling	6 sizes ½" to 1¼"	Cast bronze	Smaller, lighter, for higher pressures	Used for working pressures of 1000 psi. or more		Bar-Way Mfg. Co.
Offset Joints	½" to 24"	Stainless steel, monel, inconel, copper	For use in pipe terminals that are out of line, or offset	P = 0-1000 psi. T = 300°-1000° F.		Cook Electric Co., Magnilastic Div.
Tube Fittings	Up to 1½" O.D.	Steel and stainless steel	Flareless, requiring no special tools, permanent leak proof seal	For high temp. and pressure systems with hard temper, heavy wall tubing		Parker Appliance Co.
Tubing Fittings	1" to 4" O.D.	Stainless steel, aluminum	Provides a vacuum or pressure tight joint. Complete line of ells, tees, crosses, Y's, etc.	For light gage stainless steel tubing	Max. P = 250 psi.	Tri-Clover Machine Co.
Wrought Tubular Fittings	¼" to 4" O.D.	Monel, nickel, inconel, stainless steel	Permits light gage tubing for entire installation. Suitable for silver alloy brazing or welding	Corrosion resistant pipe lines for food, beverage, chemical, and process industries		Northern Indiana Brass Co.
C. PIPE, TUBING, AND DUCTS						
Air Hose	¼" to ½"		Light, flexible, with lengthwise and crosswise strength	Conveyor belt service. Blowing and cleaning small areas		Raybestos-Manhattan, Inc.
Armored Chemical Stoneware Pipe	2" to 60"	Permanite impregnated glass fabric over Knight-Ware	Provides acid resistance of stoneware for piping plus increased thermal and mechanical damage protection	Exposed pipe lines with hot corrosive gases and liquids, also in pressure lines	High pressures. Max. T = 350° F.	Maurice A. Knight Co.
Flexible Hose	1" to 24"	Neoprene precoated fabrics	Versatility in construction provides for easier change in physical characteristics	Cuffs, brushes, reducers or flanges can be attached		American Ventilating Hose Co.
Plastic-Coated Steel Pipe		Steel, phenolic resin	Provides corrosion resistant piping. Resists abrasion, does not flake	Oil well service	Withstands temperatures to 400°F.	The National Supply Co., Spang-Chalfant Div.
Welded Stainless Steel Tube	⅛" to 24"	Fusion welded tubing	Uniform weld, no filler metal added	Pulp and paper lines. Chemical plant and processing equipment	Max. wall thickness is ⅝"	Trent Tube Mfg. Co.
Welded Inconel Tube	⅛" to 24"	Fusion welded tubing	Close tolerance tube	Pulp and paper lines. Chemical plant and processing equipment	Max. wall thickness is ⅝"	Trent Tube Mfg. Co.
D. NOZZLES						
Pneumatic Atomizing Nozzle	½"	Brass or stainless steel	Large capacity—compressed air, steam, or other gases may be used		20, 40, 60 gal/hr capacities	Spraying Systems Co.
Water Fog Nozzle			Direct connection to water line. Swing joint mounting provides alignment with hose pull direction	Fire fighting		Bowser, Inc.
E. VALVES						
Butterfly Valve	Sizes from 15-125 psi.	Rubber sleeve	Wedge type, 100% shut off, replaceable rubber seat		Service −70° to 200° F.	R-S Products Corp.
Diaphragm Control Valve	½" to 1"	Stainless steel, other alloys	Single body casting for each size, adaptable removable flanges		Max. P (750° F.) = 600 psi. Air pressure 2-15 psi.	Hammel Dahl Co.
Diaphragm Motor Valve	¼" to 1" screwed, 1" to 3" flanged	Iron, bronze, hard lead, stainless steel, monel, Haveg, hard rubber, porcelain, Hastelloy	Low weight, simple cleanout, compact unit, available in nearly all corrosion-resistant materials		150 psi. construction only	Fischer and Porter Co.
Diaphragm Regulating Valve		Cast iron, bronze, steel	Large capacity for size; dead end tightness eliminates leakage; cooling bonnet		For pressures up to 1000 psi. Actuated by controller air or water at 20 psi.	Leslie Co.
Electrically Heated Valves			Heating element cemented to valve; accurate adjustable temperature control	Wheel type and molasses gate valves and bibb faucet types	Operate on either 110 or 220 V.	Sta-Warm Electric Co.
Extreme Pressure Relief Valve			Eliminates squeal and chatter; instant action prevents pressure peaks		Operating pressures to 5000 psi	Superdraulic Corp.

PIPE AND FITTINGS—New Equipment Announced 1946-7 (*Continued*)

Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications*	*Limitations*	*Company*
Gage-Valve			Allows removal of gage for maintenance or inspection without disconnecting valves	Where continuous operation is needed		Jerguson Gage and Valve Co.
Gate Valve	2" to 12" flanged. ½" to 2" screen		Corrosion resistant	For chemical, food, and processing industries		Ohio Injector Co.
Mechanical Goggle Valves	6" to 72"	Steel	Easy clamping and release. No moving parts contact gas stream. Operating parts concealed	Coke, chemical and metallurgical industries		William M. Bailey Co.
Micrometer Valves			Precise and continuous flow control	Liquids and gases		Standard Instrument Co.
Needle Valve	⅛" to ¾"	Carbon steel, stainless steel, or special alloys	Prevents dangerous blow-outs during opening and repacking; gaskets eliminated; positive shut off; micrometer throttling action; ball seat positive line seal		Working pressures up to 3000 psi.; temperatures to 750° F.	Kero-test Mfg. Co.
Overflow Valve	½" to 4"	Bronze, stainless steel	Maintains constant inlet pressure, relieving excess to a low pressure system	Steam, air, or gas	For inlet pressures 25 to 300 psi.; temperatures to 550° F.	Leslie Co.
Packless Diaphragm Control Valve	½" to 1½" screw. 1¼" to 12" flange	Stainless steel	Eliminates stuffing box; modified packing gland indicates any bellows failure		For pressure of 500 psi. Temperatures from 70-0° F.	Hammel-Dahl Co.
Plug Gate Valves	½" to 2"	18-8 Mo or monel	Low resistance when wide open; permits close throttling; not subject to sticking; no galling tendency			Crane Co.
Pressure Valve	¼" to 3"	Bronze	Nonmetallic disc; made in globe, angle, and check patterns	Liquified petroleum gas service	Pressures to 400 psi.	Lukenheimer Co.
Remote Adjustment Regulating Valve			Piston operated; single seated; internal pilot	Piping systems requiring hazardous or inconvenient readjustment of inaccessibly located valves		Leslie Co.
Safety-Release Valve	½", ¾" and 1"	Steel	Interchangeable nozzle inserts for 3 pressure ranges—2000, 5000, 10,000 psi.		Max. P = 10,000 psi.	Farris Engineering Corp.
Valves	¼" to 2" screw. 1" to 4" flange	18-8 Mo alloy-steel	Corrosion resistant; full line globe, gate, check and relief valves and liquid level gages	Handling corrosive products		Crane Co.
Valve	Sizes to 1"	Forged brass body	Angle and offset designs; needle and globe types; six variations of connecting arrangements	Can be directly connected to pipe or flexible tube systems		Parker Appliance Co.
F. MISCELLANEOUS						
Magnetic Screen Trap		Brass, bronze or aluminum body	Screen easily cleaned, replaced, or changed; unsupported screen gives clear filtering area	Stops all abrasive material—magnetic and non-magnetic		Cooney Valve and Screen Co.
Packless Expansion Joint		Stainless steel, monel, inconel, and copper	Combines rigid anchoring with allowance for unequal thermal expansion and contraction	Pressures from vacuum to 1000 psi. Temperatures from −300° to 1600° F.		Cook Electric Co., Magnilastic Div.
Pipe Leak Clamp	½" to 12". 6 sizes. Over 12" on request	Stainless steel clamps	Hy car pad and annealed backing plate can be hand-formed to pipe contour		Working pressures to 250 psi.	Marman Products Co.
Porous Stainless Steel Gas Spargers	4 sizes, 1" to 3½"	Stainless steel	Mounting case; fine bubbles; freedom from breakage; flexibility; high capacity	Dispersing gas and powders	Fluids, fluidizing	Micro Metallic Corp.
Porous Stainless Steel Line Filters	4 sizes, 2½" to 9"	Stainless steel	Strength, convenience; high capacity; fine filtration	Bottling filtration; general clarification; however not for collection of large volumes of solids		Micro Metallic Corp.
Pipe Line Viewer	½" to 1"	Pyrex	Pyrex glass on standard fittings	For iron, brass and stainless steel pipe lines	Operating pressures to 200 psi.	Jacoby-Tarbox Corp.
Welding Fitting	Up to 30"	Carbon steel	Seamless	Include 90° and 45° elbows, 180° return bends, tees, reducers, caps, nipples, crosses, lap joint stub ends		Ladish Co.
Welding Fitting		Stainless steel	Brings benefits of welded piping to virtually every user of stainless steel piping systems	Chemical, petroleum, food, soap industries, etc.		Tube Turns, Inc.
Steam Trap			Self-sealing outlet valve; no short circuiting of steam in opening or closing discharge valve			W. S. Rockwell Co.
Swivel Joint		Steel forgings	Low torque and positive packing seal off; 300° rotation	Specially designed for high pressures	Working pressure 12,000 psi.	Chiksan Co.
Vertical Fin Radiation Bonnet	2" and larger		Where valve is in vertical position it provides natural draft cooling packing box section	For high temperature fluids		Hammel-Dahl Co.

MATERIALS HANDLING—New Equipment Announced 1946-7

Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications*	*Limitations*	*Company*
High Density Feeder (Pulp)	Standard 62" and special	Stainless steel, steel, cast iron, plastics	Moves pulp, up to 8% bone-dry consistency, continuously and uniformly without air binding	Chemical pulp systems where bleaching at higher consistency is desirable		Allis-Chalmers Mfg. Co.
Neoprene Jacketed Bulldozer Tow Cables		Galvanized wire rope	10' length, ⅞" 6x7 galvanized wire rope, type TA.—standard universal bumper clamps. 12', ⅝" 6x7 wire rope, type T2, heavyweight universal bumper clamps		Min. Breaking strength type TA = 3000 lbs. Type T2 = 8000 lbs.	Wind Turbine Co.
Neoprene Jacket-Wire Rope Mooring Pennants	All sizes		Neoprene jackets solve erosive and abrasive problems			Wind Turbine Co.
Neoprene Jacketed Wire Rope Slings	All sizes		Lightweight slings for loads 1000-12,000 lbs. Fabricated with standard accessories of steel and aluminum thimbles, and Pres-Tite aluminum alloy connectors applied by hydraulic pressure			Wind Turbine Co.
Trylon Safety Drum Slings	Adjustable for 18"-36" grab. Two types		For 1000 and 2000 lbs. lift load. Use with electric and chain hoists. Kit consists of 5 wire rope slings, 2 11" grommets of 9000 lbs. capacity			Wind Turbine Co.

COMPANIES WHOSE NEW EQUIPMENT IS DESCRIBED IN "PROCESS EQUIPMENT DEVELOPMENTS"

Allied Steel and Equipment Co.
1007 Springfield Ave.
Irvington 11, N. J.

Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.

Alsop Engineering Corp.
Milldale, Conn.

American Chain and Cable Co.
Helicoid Gage Division
Bridgeport 2, Conn.

American Cyanamid Co.
30 Rockefeller Plaza
New York 20, N. Y.

American Machine and Foundry Corp.
511 Fifth Ave.
New York 17, N. Y.

American Machine and Metals, Inc.
Tolhurst Centrifugals Division
East Moline, Ill.

American Optical Co.
Southbridge, Mass.

American Ventilating Hose Co.
13 Park Row
New York 7, N. Y.

Amersil Co., Inc.
Engrg. Dept., Bldg. 36
900 Passaic Ave.
East Newark, N. J.

Ampco Metal Inc.
1745 S. 38th St.
Milwaukee, Wis.

Bailey Meter Co.
1050 Ivanhoe Rd.
Cleveland 10, Ohio

Baker-Raulang Co.
2168 W. 25th St.
Cleveland, Ohio

Barnstead Still and Sterilizer Co.
5 Lanesville Terrace
Forest Hills
Boston 31, Mass.

Bar-Way Mfg. Co.
Stamford, Conn.

Beardsley and Piper Co.
4710 W. Division St.
Chicago 51, Ill.

Bowser Inc.
Terryville, Conn.

Brown Instrument Co.
4494 Wane Ave.
Philadelphia 44, Pa.

Buckeye Laboratories
6700 Morgan Ave.
Cleveland 4, Ohio

Buda Co.
Harvey, Ill.

Buffalo Hammer Mill Corp.
27 Washington St.
Buffalo 3, N. Y.

Builders-Providence Inc.
9 Codding St.
Providence 1, R. I.

A. W. Cash Valve Mfg. Co.
666 E. Wabash Ave.
Decatur 6, Ill.

Chiksan Co.
332 Pomona Ave.
Brea, Cal.

Clark Industrial Equipment Corp.
Ridge Ave. & Spring Garden St.
Philadelphia 23, Pa.

Claud S. Gordon Co.
3000 S. Wallace St.
Chicago 16, Ill.

Cochrane Corp.
17th St. & Allegheny Ave.
Philadelphia 32, Pa.

Commercial Filters Corp.
A & W. 3rd Sts.
Boston 27, Mass.

Consolidated Engineering Co.
620 North Lake Ave.
Pasadena, Calif.

Cook Electric Co.
Magnilastic Div.
2710 Southport Ave.
Chicago 14, Ill.

Cooney Valve & Screen Co.
P. O. Box 1358
Erie, Pa.

Crane Co.
836 S. Michigan Ave.
Chicago 5, Ill.

Cuno Engineering Corp.
South Vine St.
Meriden, Conn.

Davis Equipment Co.
45 Halleck St.
Newark 4, N. J.

Drinkwater, Inc.
2323 S. Michigan Ave.
Chicago 16, Ill.

Duriron Co., Inc.
17 East 42nd St.
New York 17, N. Y.

Edwin L. Wiegand Co.
7500 Thomas Blvd.
Pittsburgh 8, Pa.

Electric Steel Foundry
2141 NW 25 Ave.
Portland 10, Ore.

Enterprise Engine and Foundry Co.
18th and Florida Sts.
San Francisco, Calif.

Farris Engineering Co.
374 Commercial Ave.
Palisades Park, N. J.

Fischer & Porter Co.
Hatboro, Pa.

Fletcher Works Inc.
Glenwood Ave. & Second St.
Philadelphia 40, Pa.

Food Machinery Co.
Sprague-Sells Division
Hopeston, Ill.

Hammel-Dahl Co.
243 Richmond St.
Providence 3, R. I.

Harry W. Dietert Co.
9330 Roselawn Ave.
Detroit 4, Mich.

Hercules Filter Co.
234-08 21st Ave.
Paterson 3, N. J.

Industrial Filter and Pump Co.
162Y W. Carroll Ave.
Chicago 12, Ill.

Jacoby-Tarbox Co.
205 E. 42nd Street
New York 17, N. Y.

Jerguson Gage & Valve Co.
87 Fellsway
Somerville 45, Mass.

Kerotest Mfg. Co.
2539 Liberty Axe.
Pittsburgh 22, Pa.

Koch Engineering Co.
335 West Lewis
Wichita, Kansas

Laboratory Construction Co.
1115 Holmes St.
Kansas City, Mo.

Ladish Co.
Cudahy, Wisconsin

Leslie Co.
69 Delafield Ave.
Lyndhurst, N. J.

Lovejoy Flexible Coupling Co.
5009 W. Lake St.
Chicago 44, Ill.

Lunkenheimer Co.
Beekman & Waverly Sts.
Cincinnati 14, Ohio

Marley Co., Inc.
3001 Fairfax Rd.
Kansas City, Kansas

Marman Products Co.
W. Redondo Blvd. & Hindry Ave.
Inglewood, Cal.

Maurice A. Knight
219 Kelly Ave.
Akron 9, Ohio

Metal Glass Products Co.
Belding, Mich.

Micro-Metallic Corp.
193 Bradford St.
Brooklyn 7, N. Y.

Mine Safety Appliances Co.
Braddock, Thomas and Meade Sts.
Pittsburgh 8, Pa.

Moore Co.
544 Westport Rd.
Kansas City 2, Mo.

Moore Products Co.
H & Lycoming Sts.
Philadelphia 24, Pa.

Morehouse Industries Inc.
1156 San Fernando Rd.
Los Angeles 31, Calif.

Mosher Electronic Controls
130 West 42nd St.
New York 18, N. Y.

D. J. Murray Mfg. Co.
Wausau, Wis.

National Foam System, Inc.
1408 Packard Bldg.
Philadelphia 2, Pa.

National Research Corp.
70 Memorial Drive
Cambridge 42, Mass.

The National Supply Co.
Spang-Chalfont Div.
Pitsburgh, Pa.

National Technical Laboratories
South Pasadena, Calif.

Niagara Blower Co.
405 Lexington Ave.
New York 17, N. Y.

Northern Indiana Brass Co.
Elkhart, Ind.

Ohio Injector Co.
100 Injector St.
Wadsworth, Ohio

Parker Appliance Co.
17325 Euclid Ave.
Cleveland 12, Ohio

Podbielniak, Inc.
341 East Ohio St.
Chicago 11, Ill.

Portable Pump Co.
Box 818, Central Station 1
St. Louis, Mo.

Prater Pulverizing Co.
1501 South 55th St.
Chicago 50, Ill.

% Proportioneers, Inc., %
10 Codding St.
Providence 1, R. I.

Pulverizing Machinery Co.
85 Chatham Rd.
Summit, N. J.

Ransome Machinery Corp.
1406 South Second St.
Dunellen, N. J.

Rapids-Standard Co., Inc.
308 Peoples National Bank Bldg.
Grand Rapids 2, Mich.

Raybestos-Manhattan Inc.
Manhattan Rubber Div.
92 Townsend St.
Passaic, N. J.

Republic Flow Meters Co.
2240 Diversey Parkway
Chicago 47, Ill.

W. S. Rockwell Co.
200 Eliot St.
Fairfield, Conn.

Roylyn Inc.
718 W. Wilson Ave.
Glendale 3, Cal.

R. S. Products Corp.
100 Berkley St.
Philadelphia, Pa.

Scientific Glass Apparatus Co., Inc.
49 Ackerman St.
Bloomfield, N. J.

Scientific Filter Co.
1 Franklin Square
New York 7, N. Y.

Selas Corp. of America
Erie Ave. & D St.
Philadelphia 34, Pa.

Spraying Systems Co.
40-21 L W. Lake St.
Chicago 24, Ill.

Standard Instrument Co.
15 Elkins St.
S. Boston 27, Mass.

Sta-Warm Electric Co.
503 N. Chestnut St.
Ravenna, Ohio

Superdraulic Corp.
Dearborn, Mich.

Trent Tube Mfg. Co.
Flume & Mills St.
East Troy, Wis.

Tri-Clover Machine Co.
Kenosha, Wis.

Tube Turns Inc.
224 East Broadway
Louisville, Ky.

Turbo-Mixer Corp.
10 E. 49 St.
New York 17, N. Y.

Walter Kidde and Co., Inc.
1227 Main St.
Belleville 9, N. J.

Wellington Sears Co.
65 Worth St.
New York 13, N. Y.

Wilkins-Anderson Co.
111 North Canal St.
Chicago, Ill.

William M. Bailey Co.
Pittsburgh, Pa.

Wind Turbine Co.
Wire and Cable Division
West Chester, Pa.

Yardeny Laboratories, Inc.
105 Chamber St.
New York, N. Y.

DYES

(*Continued from page 395*)

ing demands for automotive fabrics. (2) The dyeings show excellent fastness to wet manufacturing processing and to consumer washing. (3) The tensile strength, resilience and handle of the wool are surprisingly superior to wool dyed by the previously accepted methods with "fast wool colors."

In England, rayon cake dyeing has found some utility. Selected direct colors, some vat dyes, and a few indigosols and azoics have been used. Special dye kettles are used and the cakes may be dyed after manufacture, before or after drying. The dyes used must have high rates of diffusion for use in this process. A new method for vat dyeing yarn packages, called the "Abbot Cox" process, claims superior results by completely and deliberately exhausting a fine pigment dispersion of vat dyes prior to reduction. Thus, after reduction of the pigment *in situ*, the circulation of liquors containing the leuco compound in solution is claimed to be completely eliminated.

NEW PRODUCTS

Among the new products offered to the trade, there are several believed to be actually new developments. For cotton we have several vat browns, a vat yellow, a sulfur green and a fluorescent dye that can be used as an optical bleach. For wool there are several greys, reds and some beautiful milling blues that are fast to light and washing. Some products have been introduced as superior colors for nylon. These appear to be selected acid colors chosen for their light fastness on nylon. A reduced crocking line of resin bonded pigments has been introduced.

SUMMARY

The dye industry during the past year has resumed its peacetime pace. The improvement of old products and the development of new ones continue. Many of the problems of finding dyes that will withstand the many new treatments to which textiles are subjected are being solved, but new products will need to be developed to provide a full range of colors with adequate properties. Mixed fabrics containing combinations of the new synthetic fibers have increased the dyers' problems. Fibers such as nylon, Vinyon,* Saran,* glass and aluminum offer difficulty because the usual dyes do not penetrate them readily. Resin bonded pigments have helped to solve some of these problems.

The dye industry is making an honest attempt to obtain more fundamental knowledge. It is taking full advantage of modern automatic machines which so rapidly obtain accurate data. It is thus beginning to understand its problems better. As a result, new dyeing methods and machines are being evolved and promise much for the future.

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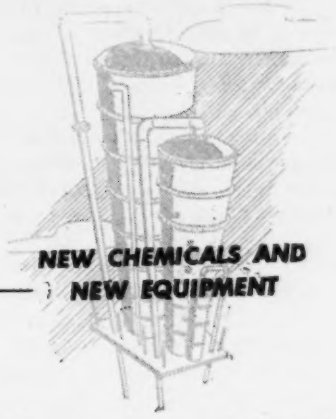
* Trade Mark Reg. U. S. Pat. Off.

Containers stored on pallets, as here at Du Pont's Chambers Works, is becoming a more and more common sight in the chemical industry.

PACKAGING AND SHIPPING IMPROVEMENTS CUT COSTS



NEW CHEMICALS AND NEW EQUIPMENT

• GETTING PRODUCTS FROM THE PLANT to the customer in good condition has always been an indispensable part of chemical operations; but today it is more than a necessary function—it's an opportunity to halt rising costs. Elsewhere in the plant and office costs have never, in the past few years, meandered gently down the slope of a valley: they have continually climbed uphill. Labor, materials, selling expense—all have succumbed to the lifting suction of the wage-price spiral.

But materials handling has bucked the tide. New techniques—developed during the war to enable us to get there first with the most—have now been adapted to industrial shipments, and everyone is benefitting. Palletized packages, motor-driven lift trucks, lighter and stronger packaging materials are all contributing their share to new economies.

Never have the problems of packaging and shipping been attacked so intensively as now. Fierce competition among suppliers has created a healthy situation, where every material, every technique is being pushed to the utmost to strengthen its position in the race.

The container and materials handling equipment manufacturers are not spending their efforts in vain, for the ever-rising flood of chemical products offers a ready market for improved materials and methods. And the chemical manufacturer, too, will gain lower costs and higher profits as a result of packaging research.

CONTAINER TRENDS

by T. PAT CALLAHAN,
Supervisor of Containers,
Monsanto Chemical Co.

PACKAGING within the chemical industry has undergone, and is still in the process of completing, many changes. During the past twelve months the continued demand for containers of practically all types used in the chemical industry has exceeded the supply; but container manufacturers, with enlarged facilities, are hopeful that the coming year will produce sufficient quantities of the packages necessary within the chemical industry. A recent article entitled "Demand for Containers Still Exceeds the Supply" published by the General Products Section, Office of Domestic Commerce, summarizes it as follows:

"While packaging is not commonly considered a trade or industry it has become a $5 billion business which covers design, testing, production, shipping and merchandising. Packaging calls for a wide variety of materials among which are glass, tin, cellophane, paper, folding boxboard and steel.

"Much consideration has been given to obtaining suitable containers as they often sway the consumer's decision to select the article offered for sale."

In discussing the trend of packaging as it affects the chemical business, we shall confine ourselves to glass containers, wooden and fiberboard containers, multiwall bags, and metal containers.

GLASS AND WOOD

Glass containers continue to be a very important part of the chemical industry, because for many chemicals no substitute has yet been found which protects the purity of the product as well as glass. For the chemical manufacturer, the recently developed ICC-1D glass carboy is still gaining ground, and the recent decision of the Interstate Commerce Commission to allow shipment of various chemicals of a hazardous nature in the 6½-gallon glass carboy will lead to even greater use. Production of 13-gallon carboys still continues high and is absorbed by the chemical industry. The use of smaller glass bottles within the industry will increase, we feel, and it appears that the glass container industry will be able to meet all of the demands which will be placed upon it by the chemical industry.

Wooden containers, particularly wooden boxes and wooden barrels—both slack and tight—have been very short for several years as a result of the excessive demand created by the war. They are now available in good supply and, as things level off, it is felt that this form of package will be readily obtainable. Wooden containers, however, will find a very keen competitor in fiber containers—both fiber boxes and fiber drums.

FIBERBOARD AND PAPER

The rapid strides made by the industry in treatment of fiberboard to insure strength and rigidity have made this form of container a very satisactory package for the shipment of various chemical commodities. The low tare weight of fiber boxes or fiber drums as compared to similar capacity of wood give this form of package a very definite advantage, particularly in view of the ever mounting freight increases which apply equally to the product and the container in which the product is shipped. While the supply of fiberboard is still short, it is anticipated that the desired strengths of board will be obtainable so that the use of this type of container can be increased.

The use of multiwall paper bags by the chemical industry has increased by rapid strides. This package, without

question, is the most economical that can be used for the shipment of dry and powdered products. Continued research by the manufacturers of multiwall paper bags has produced bags far superior, in so far as strength is concerned, to any bags previously manufactured, and the industry is turning to this form of packaging to a large extent. There are many intangible advantages to the use of multiwall paper bags, particularly as regards savings involved in storing empty bags in the manufacturer's plant and the filled container in the customer's plant. Their low tare weight is another obvious advantage. We feel that the expanded facilities of the multiwall paper bag manufacturers will insure sufficient supply, although the increased trend toward the use of this package will make it necessary for those desiring this type of container to notify suppliers sufficiently in advance so that the desired number of multiwall paper bags can be obtained at the proper time.

METAL AND COATINGS

Metal containers, which include cans, pails, and drums, will still be used in very large quantities by the chemical industry. Metal cans, particularly those commonly referred to as tin cans, will return to their proper place in the chemical field now that allocations for tin have been removed. The trend, we feel, will be, in a great many cases where substitutes had to be used during these extreme shortages, back to tin. Tin coating by electrolysis, a new process recently developed, insures a uniform coating of tin on the steel and the greatly increased speed of coating will obviously increase the production of this form of container. Another advantage of the electrolytic process is that tins should be produced more economically under this method than under the older method. All tin containers are not manufactured by the electrolytic process, but a sizable percentage will help increase the industry's output.

Steel drums, particularly the 55-gallon size, have been a definite bottleneck in the proper shipping of liquid chemicals for the past several years as a result of the extreme shortage, which made it necessary continually to re-use steel drums. The most pleasing prospect on the horizon at this writing is the patent likelihood that, during the forthcoming year, the necessity for re-use of the 55-gallon steel drum will be eliminated and new drums readily obtained. While this will have a depressing effect on the second-hand market for steel drums, it is felt that the chemical industry, which desires to ship material free from contamination of any kind, will benefit. Another development in the steel drum picture for the chemical industry is the widespread research now in progress both in the industry and by the drum manufacturer in the use of synthetic coatings to line the interiors of these containers. Much work has already been done and much more is to be accomplished. The next twelve months should see a marked development in this form of treatment of 55-gallon drums, which will insure purity and freedom from contamination by iron of products in steel drums.

EVALUATION NEEDED

The container picture for the chemical industry is brighter at the present time than it has been for several years. The problem is to evaluate the substitutes which have been forced upon the industry due to shortages and eliminate those which are not as practical as the container for which the substitution was made. Containers constitute a sizable investment in the cost of the finished product, and it will definitely pay if sufficient attention is given to the problem.

(Illustrations Courtesy E. I. du Pont de Nemours & Co., Inc.)

"The old order changeth . . ."

HANDLING TRENDS

by NORMAN L. CAHNERS,
Publisher,
"Modern Materials Handling"

DURING the past two years the concept of materials handling has undergone a marked change. In this period we have seen a definite expression of a trend towards interstation shipment. This trend has brought about several new developments which represent a distinct innovation in materials handling.

The growing interest in interstation shipments has naturally brought about developments in the equipment most extensively used in the distributing end of business operation. Therefore, the creation of improved types of fork trucks and pallets has been marked.

In addition to improvements upon existing equipment, manufacturers have evolved important new products.

EXPENDABLE PALLETS

An inexpensive, light-weight, one-time shipper has long been a crying need throughout industry. The past two years have seen many attempts along this line, culminating recently in pallets which bid fair to fill the role. An outstanding example is the Chuckaway pallet which weighs 6 lbs., has been tested for 18,000 lbs. static load and 6,000 lbs. dynamic load, and is impervious to moisture. Chuckaways will soon be in volume production at a sufficiently low price to warrant their use. Heretofore, such pallets have been too costly for one-time use.

POWERIZED, TIERING, HAND-POWERED TRUCK

This equipment, recently introduced by several manufacturers, is designed to

". . . yielding place to new."

overcome the objection to using heavy equipment in areas where floor capacities cannot withstand the load. Its light weight and maneuverability make it ideal for use in narrow aisles and low-ceiling warehouses with low clearance doors. Price, too, is considerably less than that of a regular fork lift truck.

FORK TRUCK UNLOADER

This adaptation of a standard fork truck permits loads to be pushed off a pallet in one unit and shipped or stored without the pallet One adaptation of this uses a steel plate instead of two forks. The unloading device in this model has two clamps attached to it which engage a corrugated sheet which is used in lieu of a pallet. These clamps can pull the corrugated sheet onto the metal plate by using the pusher device in reverse. Loading is accompanied by pushing the entire load, corrugated sheet and all, off the metal plate onto the floor or atop another load. In certain specialized cases the pallet can thus be eliminated.

AUTOMATIC PALLETIZING MACHINES

Several different types of this machine are now under development or actually in production. These are designed to palletize cartons automatically as they come off production lines and thus eliminate the need for costly hand-stacking onto the pallet. These machines are economically feasible where the speed of cases coming off the production line warrants automatic handling. Types now packed include both completely automatic, electronically-controlled models and models where one operator controls the selection of the pallet pattern.

PALLET POOLS

Another outstanding development has been the formation of a national pallet pool.

The Lawrence Pallet Pool is designed to relieve the shipper of the worries inherent in sending pallets out of his jurisdiction. Shippers and receivers can arrange to procure standard four-way pallets on a rental basis at a nominal sum and have these replaced when their supply reaches a certain minimum. In addition to the basic rental cost, a nominal fee is charged for each pallet shipped. Maintenance parts are supplied by the pallet exchange at cost. All accounting for pallets is porformed by the pallet exchange. Companies entering the pool are thus assured that in shipping to other pallet-pool participants all merchandise can readily be handled. Also, all receipts from other participants will arrive on pallets which will fit into their pattern of operation.

FREIGHT ON PALLETS

Coupled with the above is the distinct effort on the part of industry to obtain better freight rates for pallets from common carriers. At the present time, pallets take the commodity rate; i. e., pallets carrying canned juice have the same rate as the juice; pallets carrying windshield wipers take the same rate as the wipers. Even now, far-seeing railroads are reconsidering their rate structure to allow a lower rate on pallets.

A hope for the future is that railroads will come to consider pallets as necessary handling equipment which can be used to sufficiently good advantage that doing away altogether with freight rates is warranted. The railroads would profit from the reduced car turn-around time resulting from faster loading and unloading operations. Shippers and receivers would reap the benefits of lowered costs and better handling.

PACKAGE HANDLING—New Equipment Announced 1946-7

Type of Equipment	*Sizes*	*Construction Materials*	*Distinguishing Features*	*Applications and Limitations*	*Company*
A. POWER TRUCKS					
Fork Truck	Capacity 2000 lbs.		Center control	Handling of slasher beams in rayon plant	The Baker-Raulang Co.
Gasoline Fork Lift Truck	1000 and 2000 lbs. capacity		Pneumatic wheels, no gear shifting, lightweight, 17% gradeability	Shipping, receiving, storing, production	Clark Industrial Equipment Corp.
Industrial Shop Truck	½ and 1 ton platform—tractor and fork lift models	Steel welded construction	7.7 HP. air-cooled engine. Two brakes—automatic and foot. 7' turning radius	All types of material handling	The Buda Co.
Low Lift Platform Truck	4000 lbs capacity		Spark enclosed construction for operation in hazardous atmospheres	Handling of crumb cans in rayon plant	The Baker-Raulang Co.
B. HAND TRUCKS					
Barrel Cradle	18" from spigot to floor	Steel	Slide handle provides leverage for one man tilting	Cradle for drums on drain	Clark Industrial Equipment Corp.
Leverpak Hand Truck	56"	Steel	Automatic pick-up of fibre drums	Handling of all fibre drums	Clark Industrial Equipment Corp.
Tilt Truck Attachment		Steel	One man can handle heaviest hand truck loads on three wheel truck	Attachment on any three wheel hand truck	Clark Industrial Equipment Corp.
C. CONVEYORS					
Gravity Conveyor Switch Curves	12" and 18" wide	Arc-welded steel	Permit routing gravity conveyor line in two opposite directions for conveying packaged goods	Not used for irregular shaped goods	The Rapids-Standard Co.

(Courtesy Freeport Sulphur Co.)

Sulfur, basis of many long-established heavy chemicals, yearly finds its way into scores of "New Chemicals for Industry."

NEW CHEMICALS FOR INDUSTRY

NEW CHEMICALS AND NEW EQUIPMENT

• Chemical Industries presents here a catalog of new chemicals and chemical specialties introduced by its advertisers since August, 1946. Chemicals and specialties are grouped separately in alphabetical order. These products will be displayed in Chemical Industries' exhibits at the Pacific Chemical Exposition, San Francisco Civic Auditorium, October 21-25, and at the 21st Exposition of Chemical Industries, Grand Central Palace, New York City, December 1-6.

ACETALDEHYDE DISULFONIC ACID, DI-POTASSIUM SALT

$OCHCH(SO_2OK)_2 \cdot H_2O$. Mol. Wt., 298.4. Free flowing crystals, non-hydroscopic and stable in storage. Stable in aqueous acid or neutral solutions, decomposes in alkaline solution. Solubility in water 1 g per 100 g at 25°C, 20 g per 100 g water at 100°C. Chemical properties: The aldehyde group is extremely reactive, condensing readily with ammonia, aromatic and aliphatic amines, amides, aromatic ring compounds (hydrocarbons, phenols, etc.), alcohols and mercaptans. Uses: As intermediate in the preparation of base exchange resins, dyes, drugs, tanning agents and wetting agents. Available in experimental quantities for laboratory research investigation. General Chemical Co.

ACETONE CYANOHYDRIN

$(CH_3)_2C(OH)CN$. Mol. Wt., 85. Sp. Gr., 0.925 at 25°C. Purity, 97-98%. B. P., 82°C./23 mm., but distillation is not recommended because of ease of decomposition to HCN and acetone. Contains small amount of phosphoric acid as stabilizer. Infinite solubility in water and alcohols. In general, similar solubility to tertiary butyl alcohol. Chemical properties: Typical reactions of tertiary hydroxyl and nitrile groups. Forms heterocyclic derivatives, such as dimethyl hydantoin. Use: Intermediate for organic synthesis. Available in commercial quantities. Rohm & Haas Co.

ACETYLENEDICARBOXYLIC ACID

$HOOC\text{-}C{\equiv}C\text{-}COOH$. Mol. Wt., 114.06. M. P., 175-6°C. White, crystalline solid. Odor, sharp. Very soluble in water, alcohol and ether. Chemical properties: The very reactive triple bond coupled with two carboxyl groups offer many interesting and varied possibilities in organic synthesis. Uses: Preparations of resins, plastics, pharmaceuticals, medicinals, acetylenic esters, dyes, plasticizers and general organic synthesis. Available in limited quantities. Farchan Research Laboratories.

ACONITIC ACID

$CH(COOH){=}C(COOH)CH_2COOH$. Mol. Wt., 174.11. An unsaturated tribasic acid produced in white to a slightly yellowish crystals. M. P. 180°C (with decomposition). Solubility in water—1 part in 3, slightly soluble in organic solvents. Undergoes usual acid reactions as well as additions at the double bond. Uses: Chemical intermediate, antioxidant, plastics where particularly the esters have been useful as plasticizers. Charles Pfizer & Co., Inc.

ACRAMINE

(2-Methoxy-6-chloro-9-aminoethylamino-acridine)

$C_{16}H_{18}N_3OCl$. Mol. Wt., 301.5. M. P., 141-142°C. Yellow crystals, soluble in benzene, dilute mineral acids. Use: Reagent for rapid determinations of Peniillin in urine, blood and other media, according to the procedure by Scudi and Jelinek, J. Biol. Chem. 164, 195 (1946). Available in commercial quantities. Bios Laboratories.

ACROLEIN

$CH_2{=}CH\text{-}CHO$. Mol. Wt., 56.06. Sp. Gr., 0.8389 at 20°/4°C. R. I., 1.4017 at 20°C. B. P., 52.69°C at 760 mm. Solubility in water, 20% at 0°C. Flash Pt., Tag open cup <0°F. Acrolein is a highly reactive unsaturated aldehyde which offers an almost unlimited number of reaction possibilities for the synthesis of heterocyclic ring compounds, polybasic acids, diamines, alcohols, acetals, and more complex derivatives. The versatile reaction characteristics of acrolein and its derivatives make this compound of interest to all branches of the industry. Acrolein can also be used as an intermediate in the preparation of polymerizable monomers. An example is the reaction product of acrolein with acetic anhydride, the diacetate, which has been used in making interesting polymers and copolymers. Acrolein is also interesting as a raw material for aldehyde type resins such as those obtained by condensation with phenol. Transparent resins result from the reaction of acrolein with urea at elevated temperatures in the presence of either acidic or basic catalysts. Condensing acrolein with polyhydric alcohols such as pentaerythritol produces polymeric materials which air dry to durable films. Shell Chemical Corp.

l(+)-ALANINE

$CH_3CH(NH_2)COOH$, natural isomer. Mol. Wt., 89.1. M. P., 295°C. dec. Colorless prisms. Soluble in 45 parts of water. Insoluble in alcohol and ether. Spec. Rotation, $(\alpha)_D = +2.7°$. Uses: Only the naturally occurring form is utilized in biochemical processes and serves therefore in biochemical and clinical studies of amino acid metabolism, in microbiological investigations and in the formulation of culture media. Available in research quantities. Bios Laboratories.

ALLOXAZINE

$C_{10}H_8O_2N_4$. Mol. Wt., 214. Greyish-green powder which decomposes above 300°. Insoluble in alcohol, water and ether. Soluble in aqueous alkalies. Use: Intermediate in the preparation of pharmaceuticals and dyes. Available in research quantities. Bios Laboratories.

ALLYL ACETATE

$CH_3COOCH_2CH{=}CH_2$. Mol. Wt., 100.11. B. P., 103.5°C. Sp. Gr., 0.9276 at 20/4°C. R. I. D/20, 1.40488. Suggested for polymerization and copolymerization reactions with vinyl chloride and other unsaturated monomers. Available in research quantities. Carbide and Carbon Chemicals Corp.

ALLYLIDENE DIACETATE

$CH_2{=}CHCH(OCOCH_3)_2$. Mol. Wt., 158.15. Sp. Gr., 1.0749 at 20/20° C. B. P., 107° C. at 50 mm. Freezing pt., –37.6° C. R. I., 1.4193. Flash pt (open cup), 220° F. Solubility in water, 1.8% by wt. at 20° C. Colorless. Of particular interest as a convenient source of acrolein, which it yields quantitatively upon hydrolysis. Adds hydrogen, halogens, hydrogen halides, and hypohalous acids to give products useful in further syntheses. Available in limited drum quantities. Carbide and Carbon Chemicals Corp.

9-AMINOACRIDINE HYDROCHLORIDE

$C_{13}H_{11}N_2Cl$. Mol. Wt., 266.6. Pale-yellow, crystalline, bitter tasting, odorless powder. Soluble in water (1:300). Antiseptic for topical use, unaffected by dissolved proteins (pus) or p-aminobenzoic acid. Compatible with sulfonamides. Effective against broad bacterial spectrum including pneumococci, streptococci, staphylococci, bacterium coli and proteus vulgaris. Stable to light and does not stain tissues. Winthrop Chemical Company, Inc.

2-AMINOETHYL SULFURIC ACID (Good-Rite)

$NH_2CH_2CH_2SO_4H$. Mol. Wt., 141. Sp. Gr., 1.782. Bulk density, 1.007 grams/cc. Physical state, white crystalline powder. M. P., sinters at 274°C. and darkens without complete melting at 280°C. Solubility in water, at 100°C., 104g./100cc; at 23°C., 1.2g./100cc. Insoluble in most organic solvents. pH of 1% aqueous solution at 20°C., 4.0; of 5% aqueous solution at 39°C., 3.3. Chemical properties: Extremely resistant to hydrolysis in acid or neutral solutions. Does not undergo typical reactions of aliphatic primary amines or sulfate ion. Can be titrated with alkali. Reacts with strong sodium hydroxide (excess) to form ethylene imine. Substitutes an aminoethyl group for active hydrogens in fatty acids, mercaptans, hydrogen sulfide, and for sodium in sodium di and tetra sulfides. Forms 2-mercaptothiazoline with carbon disulfide in presence of alkali. Reacts with xanthates to form substituted thiazolidines and with sodium sulfite to form taurine. Uses: A starting material for preparation of ethylene imine, an amino ethylating agent, an intermediate in the preparation of heterocyclic compounds containing nitrogen and sulfur. Available in limited experimental quantities. B. F. Goodrich Chemical Co.

3-AMINOPYRIDINE

$C_5H_6N_2$. Mol. Wt., 94.1. M. P., 64° C. B. P., 252° C. Colorless to light tan leaflets. Soluble in water, alcohol and most organic solvents. Chemical properties: The amino group shows the normal reactions such as acylation, alkylation and diazotization. Use: Intermediate in the preparation of drugs and dyestuffs. Available in limited quantities. Bios Laboratories.

2-AMINOQUINOXALINE

$C_8H_7N_3$. Mol. Wt., 145. M. P., 155-156°C. Yellow needles. Soluble in water, alcohol and ether. Use: Intermediate in the synthesis of pharmaceuticals. Available in limited quantities. Bios Laboratories.

AMMONIUM ISOVALERATE

$(CH_3)_2CH_2CH_2COONH_4 \cdot 2(CH_3)_2CH_2CH_2COOH$. Mol. Wt., 323.3. Colorless, very deliquescent crystals, soluble in 0.3% water. Characteristic pungent odor. Uses: In imitation butter flavors; in medicine. Chemo Puro Mfg. Corp.

dl-ASPARAGINE

$H_2NCOCH_2CH(NH_2)COOH$. Mol. Wt., 132.1. M. P., 213-215°C. dec. Colorless crystals. Very soluble in hot water. Insoluble in alcohol and ether. Uses: Biological research, preparation of culture media and microbiological

determinations. Available in commercial quantities. Bios Laboratories.

l(−)-ASPARAGINE

$H_2NCOCH_2CH(NH_2)COOH$. Mol. Wt., 132.1. M. P., 226°C. Colorless crystals. Soluble in 40 parts of water. Insoluble in alcohol and ether. Spec. Rotation, $(\alpha)_D = -5.4°$. Uses: This natural amino acid is used in biochemical studies, preparation of culture media and microbiological determinations. Available in commercial quantities. Bios Laboratories.

l(+)-ASPARTIC ACID

$HOOCCH_2CH(NH_2)COOH$. Mol. Wt., 133.1. M. P., 269-271°C. Colorless crystals. Soluble in 200 parts of water. Insoluble in alcohol. Spec. rotation, $(\alpha)_D = +6°$. Use: As natural amino acid. Available in commercial quantities. Bios Laboratories.

AZOBENZENE-p-SULFONIC ACID

$C_{12}H_{10}O_3N_2S$. Mol. Wt., 262. M. P., 129°C. Orange crystals. Use: Intermediate and reagent chemical. Available in commercial quantities. Bios Laboratories.

AZODINE (Benzeneazonaphthylethylenediamine)

$C_{18}H_{18}N_4$. Mol. Wt., 290. M. P., 107-108°C. Red crystals. Use: Reagent for the rapid determination of Penicillin in blood, urine and other media. Available in commercial quantities. Bios Laboratories.

BARIUM BROMATE

$Ba(BrO_3)_2.H_2O$. Mol. Wt., 411.21. Sp. Gr., 3.820. Decomposes at 260° C. White crystal, Sparingly soluble in cold water, more soluble in hot water; insoluble in alcohol. Uses: Reagent: Inorganic Synthesis. City Chemical Corporation.

BARIUM PERIODATE

$Ba(IO_4)_2$. Mol. Wt., 519.20. White cryst. (Deliquescent). Readily soluble in water. City Chemical Corporation.

BARIUM STANNATE

$BaSnO_3 \cdot 3H_2O$. Mol. Wt., 358.1. Theo. comp., BaO 42.5%, SnO_2 42.1%. White crystalline powder sparingly soluble in water. Readily soluble in HCl. Used as an ingredient in dielectric materials. Available in pilot plant quantities. Metal & Thermit Corporation.

BARIUM TRIFLUOROACETATE

$(CF_3COO)_2Ba$. Mol. Wt., 363.4. White crystalline compound. Slightly soluble in water and alcohol. Odorless with bitter taste. To be used for the synthesis of trifluoroacetic acid and derivatives. Columbia Organic Chemicals Co., Inc.

4,4'-BISANTIPYRENE (FORBISEN)

$C_{22}H_{22}N_4O_2$. Mol. Wt., 374.43. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

1,1 - BIS(PARACHLOROPHENYL) - 2,2 - DICHLOROETHANE (Rhothane D3)

$(4\text{-}ClC_6H_4)_2CHCHCl_2$. Mol. Wt., 320. M. P., 109° to 110°C. Soluble in aromatic hydrocarbons, chlorinated solvents and other organic solvents. Basicity, negative. Odor, mild. Color, white. Uses: Active ingredient in various types of insecticidal compositions. Available in quantity. Rohm & Haas Co.

BISMUTH CHROMATE (Basic Dichromate)

$Bi_2O_3.2CrO_3$. Mol. Wt., 666.02. Orange-red powder. Insoluble in water, soluble in acids and alkalies. Use: Pigment. City Chemical Corp.

BISMUTH PHOSPHATE

$BiPO_4$. Mol. Wt., 304.02. Sp. Gr., 6.323. White powder, Insoluble in water and dilute Nitric Acid, Soluble in Hydrochloric Acid. Use: Medicinal. City Chemical Corp.

BROMOCAMPHOR

$C_{10}H_{15}OBr$. Mol. Wt., 231.03. Colorless crystals with slight Camphor odor and taste. Also available in powder form on special order. Almost insoluble in water but soluble in 6.5 parts Alcohol, 0.5 parts Chloroform, 1.5 parts Ether, slightly soluble in Glycerin. This chemical discolors readily under prolonged exposure to light and should be stored in a cool, dark place. Use: In medicine and as an intermediate in the production of therapeutically valuable Camphor derivatives. Available in commercial quantities. Chemo Puro Mfg. Corp.

(2-BROMOETHYL) CYCLOHEXANE

$C_6H_{11}CH_2CH_2Br$. Mol. Wt., 191.12. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

p-BROMOPHENYL PHENYL ETHER

$(BrC_6H_4)O(C_6H_5)$. Mol. Wt., 249.11. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

BROMOPHTHALIC ANHYDRIDE

$C_8H_3O_3Br$. Mol. Wt., 227.0. Melting Range, 71-98°C. Pale tan crystals. Soluble in organic solvents. Dissolves in water to the phthalic acids. Suggested for use in synthesis of dyes, pharmaceuticals, plasticizers and general organic intermediates. Available in commercial quantities. National Aniline Division, Allied Chemical & Dye Corp.

4-tert-BUTYLCYCLOHEXANOL

$HOC_6H_{10}C(CH_3)_3$. Mol. Wt., 172.26. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

n-BUTYL ACRYLATE

$CH_2{=}CHCOOCH_2CH_2CH_2CH_3$. Mol. Wt., 128. B. P., 147°C. Color, 8 (APHA). Density, 7.44 lbs./gal. at 25°C. Acid No., 0.28. Purity, 99%. Polymerizable and reactive unsaturated ester. Uses: In polymers and copolymers, and as an intermediate in organic synthesis. Available in pilot plant quantities. Rohm & Haas Co.

N-n-BUTYL BENZENESULFONAMIDE

$C_6H_5SO_2NHCH_4H_9$. Mol. Wt., 213.29. Sp. Gr., 1.148 at 25°/25°C. R. I., 1.5235 at 25°C. B. P., 189-90°C. at 4.5 mm.; 219°C. at 17 mm. Flash pt., 363°F. (COC). Only slightly soluble in water. Odor, pleasant. Color, amber to straw. Chemical properties: Reacts with aqueous alkali metal hydroxides to form the metal salt of the amide. Nitration with concentrated nitric acid can result in nitration of the ring or formation of nitramide. Reacts with alkylating agents in alkaline media to give N,N-disubstituted amide. Reacts with benzenesulfonyl chloride in the presence of caustic to form N-Butyl dibenzenesulfonamide. Reacts with formaldehyde to form resins. Shows other reactions common to N-substituted benzenesulfonamide. Uses: In the synthesis of dyes, pharmaceuticals and other organic chemicals. In resin manufacture and as a plasticizer for certain types of synthetic resins. Available in pilot plant quantities. Wyandotte Chemicals Corporation.

N, N-Di-n-BUTYL BENZENESULFONAMIDE

$C_6H_5SO_2N(C_4H_9)_2$. Mol. Wt., 269.39. Sp. Gr., 1.061 at 25°/25°C. R. I., 1.5056 at 25°C. B. P., 183-4°C. at 4.2 mm.; 213°C. at 15 mm. Flash Pt., 325°F. (coc). Solubility in water, very low. Odor, pleasant. Color, light amber to straw. Chemical properties: As both amide hydrogens have been replaced, the compound is very unreactive chemically. However, vigorous nitration will nitrate the ring. Uses: The stability and unreactive nature of this compound suggest its use as a plasticizer. Available in pilot plant quantities. Wyandotte Chemicals Corp.

p,p'-sec-BUTYLIDENEDIPHENOL (Bisphenol B)

$(C_2H_5)(CH_3)C(C_6H_4OH)_2$. Mol. Wt., 246.3. Use: Chemical Synthesis. Available in experimental quantities. The Dow Chemical Co.

3-BUTYN-1-OL (β-Ethynyl Ethanol)

$HC{\equiv}CCH_2CH_2OH$. Mol. Wt., 70.09. Density, 0.9257 at 20°/4° C. R. I., 1.4409 at 20° C. B. P., 128.9° C. (760 mm.). Freezing pt., 63.6° C. Odor, characteristic. Color, water-white. Chemical properties: The very reactive triple bond in this alcohol offers wide possibilities in organic chemical synthesis. Uses: Preparation of perfume bases, acetylenic esters, plastics, plasticizers, pharmaceuticals, wetting agents, medicinals and general organic synthesis. Available in limited quantities. Farchan Research Laboratories.

CALCIUM PENICILLIN

An amorphous form of the antibiotic formed during the growth on a nutrient medium by certain strains of the genus, Penicillia, recovered as the calcium salt. It can be stored 18 months at not above 15° C. without undue loss in potency. Soluble in water. Care must be exercised to keep moisture free until use as gradual decomposition of solutions will occur. Sterile, non-toxic and free from pyrogenic substances. Available in bulk bottles for compounding, ranging from 1000-1200 units per milligram. Also produced in a tablet grade generally having a slightly lower potency. Uses: Pharmaceutical and veterinary medicament. Charles Pfizer & Co., Inc.

CARBON SUBOXIDE

$OC{=}C{=}CO$. Mol. Wt., 68. M. P., 111.3°C. B. P., +7°C. Colorless liquid or gas. Chemical properties: Highly reactive compound forming malonic esters and amides with alcohols and amines. Uses: Reagent and intermediate. Available in research quantities only (in ether solution). Bios Laboratories.

CHLORDANE, (Velsicol "1068")

$C_{10}H_6Cl_8$. Mol. Wt., 409.8. Sp. Gr. at 25°/4°C, 1.6876. R. I., 1.5740 at 20°C; B. P., 175°C at 2 mm. Completely soluble in organic solvents such as aliphatic, aromatic and chlorinated hydrocarbons, as well as in ketones, ethers, and esters. In presence of alkaline reagents, it dehydrogenates with loss of insecticidal activity. When used at conc. of 2% by weight in kerosene type solvent "Velsicol" 1068 Chlordane will control Ants, Bedbugs, Carpet Beetles, Flies, Roaches, Mosquitoes, Silverfish and Spiders. For agricultural use, it is used as a dust or water emulsion. Applied at dosage of 1 lb/acre, it will control Grasshoppers, Chinch Bug, Cotton Boll Weevil, Spittle Bug, White Grubs, Aphids. A water emulsion spray of 0.25-0.50% of the toxicant controls Horn Flies, Bot Flies, Fleas. There is a residual period of 2-3 weeks from such a treatment. Velsicol Corp.

CHLORDANE (Octa-Klor)

$C_{10}H_6Cl_8$. Mol. Wt., 409.8. Sp. Gr., 1.55-1.62 at 60/60. Weight per Gal., 13.0-13.5 lbs. B. P., 175°C. at 2mm. Color, refined grades: pale amber; agricultural grade: amber. Odor, refined grade: faintly aromatic; agricultural grade: mild cedar. Solubilities, Completely miscible in all non-polar solvents, including ketones, alcohols, ethers, esters, aromatic and non-aromatic hydrocarbons including deodorized kerosene; insoluble in water. Julius Hyman & Co.

o-CHLOROBENZOIC ACID

$C_7H_5O_2Cl$. Mol. Wt., 156.5. M. P., 140°C. Crystalline solid. Sublimes. Soluble in ethanol, ether and hot water. Uses: As an intermediate for synthesis. Availability: Research quantities. Monsanto Chemical Co.

p-CHLOROBENZOIC ACID

$C_7H_5O_2Cl$. Mol. Wt., 156.5. M. P., 235°C. Crystalline solid. Sublimes. Soluble in ethanol and ether. Sparingly soluble in water. Uses: As an intermediate for synthesis. Availability: Research quantities. Monsanto Chemical Co.

4-CHLORO-o-CRESOL

$CH_3(Cl)C_6H_2OH$. Mol. Wt., 142.58. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

6-CHLORO-o-CRESOL

$CH_3(Cl)C_6H_2OH$. Mol. Wt., 142.58. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

γ-CHLOROBUTYRONITRILE

$ClCH_2CH_2CH_2CN$. Mol. Wt., 103.5. B. P., 78-80°C. at 12 mm. pressure. Colorless liquid. Use: Intermediates. Available in limited quantities. Bios Laboratories.

m-CHLOROETHYLBENZENE

C_8H_9Cl. Mol. Wt., 140.5. B. P., 181-186°C. R. I., 25°, 1.5170. Soluble in the usual organic solvents. Colorless liquid. Insoluble in water. Uses: As an intermediate for synthesis. Availability: Research quantities. Monsanto Chemical Co.

o-CHLOROETHYLBENZENE

C_8H_9Cl. Mol. Wt., 140.5. B. P., 80°C. at 30 mm. R. I., 25°, 1.5190. Sp. Gr. at 25°/25°, 1.055. Colorless liquid. Soluble in the usual organic solvents. Insoluble in water. Use: As an intermediate for synthesis. Availability: Research quantities. Monsanto Chemical Co.

p-CHLOROETHYLBENZENE

C_8H_9Cl. Mol. Wt., 140.5. B. P., 179-180°C. and 84.5°C. at 30 mm. R. I., 25°, 1.5152. Sp. Gr., 25°/25°, 1.044. Colorless liquid. Soluble in the usual organic solvents. Insoluble in water. Use: As an intermediate for synthesis. Availability: Research quantities. Monsanto Chemical Co.

2-CHLOROTHIOPHENE

C_4H_3ClS. Mol. Wt., 118.6. B. P., 128°C. Colorless liquid. Use: Intermediate for dyes and pharmaceuticals. Available in limited quantities. Bios Laboratories.

(*Turn to page 446*)

THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES

PEOPLE

W. I. Galliher, named executive sales manager, Columbia Chemical & Southern Alkali.

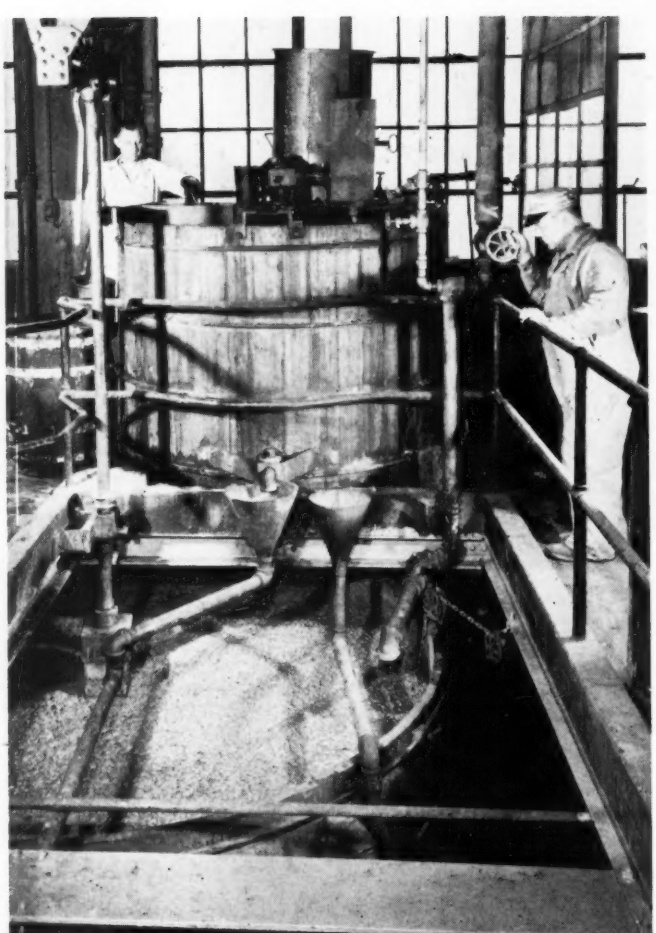
Cary Wagner, now vice president in charge of research, General Aniline & Film Corp.

E. V. Murphree, recently elected president of the Standard Oil Development Company.

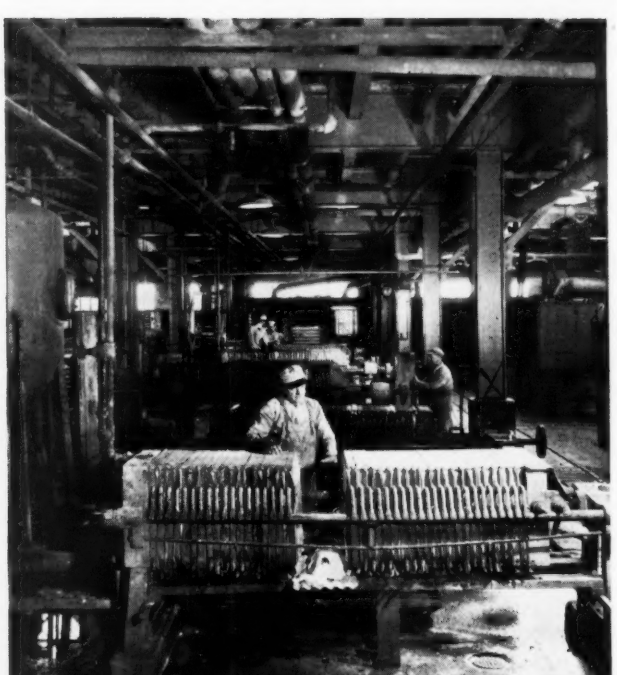
Warren K. Lewis, professor at M. I. T., has received the Priestley Medal for distinguished services to chemistry, at the 112th. national meeting of the American Chemical Society.

W. N. Thompson, v. pres., The H. K. Ferguson Co., project director of the atomic pile at Brookhaven.

Lucas P. Kyrides, appointed president of Chemical Specialties, Inc. He was formerly director of research, Organic Chemical Division, Monsanto Chemical Co.



1 Tubs of chemicals are emptied into large vats for striking. After the color has settled for 24 hours, water is siphoned off

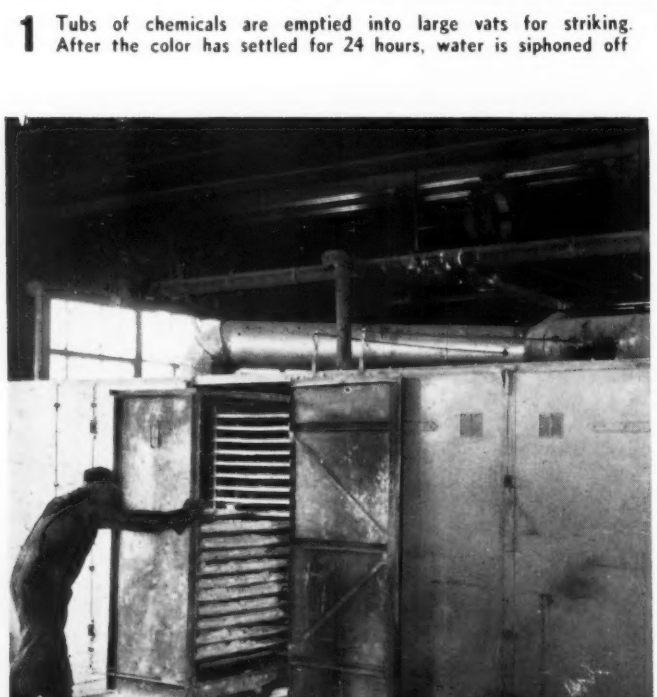


2 Remaining water is largely removed by filter presses. The product, in the form of a solid, damp cake, is cut from the filter cloth.

Behind the Scenes

Flourishing in the last century, the dry color industry is an old, well-established activity. But the small, relatively haphazard plants of fifty years ago were a far cry from the modern factories of today. Then it took a lot of luck and considerable art to get a good quality batch of product; today uniform high quality is the result of painstaking scientific control.

In recent years progressive companies in the pigment field have become objective in their approach, have cast aside sentiment for



3 The pressed cake of color is placed in drying racks and rolled into ovens, where it is dried at 160 degrees for 48 hours.

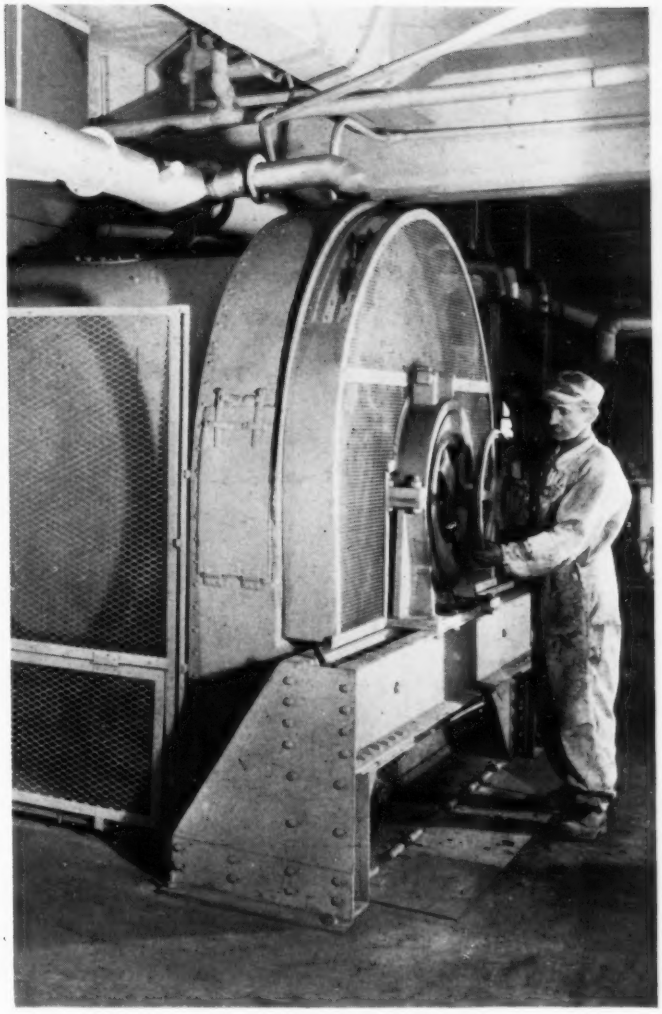
4 After drying, the color is dropped through a chute to floor below, where it is ground to a powder and emptied into portable tanks.

5 The pigments are tested in the laboratory. Samples from various runs are blended to desired colors to determine proportions.

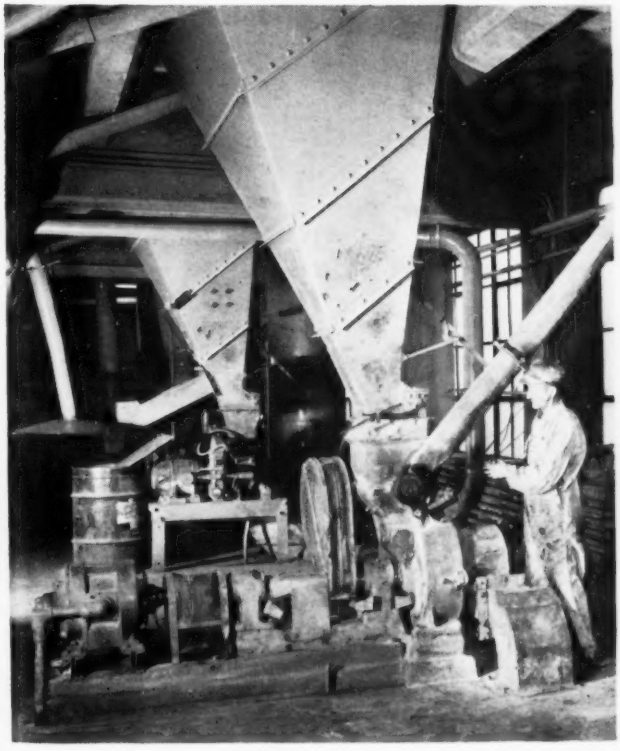
with Dry Colors

time-honored principles and practices. Processes have been streamlined, inclined from batchwise towards continuous operation.

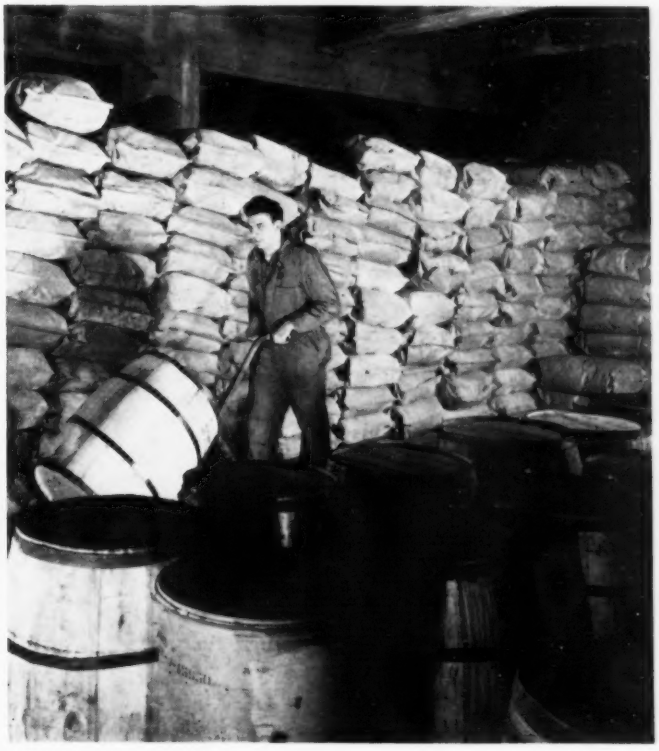
Various steps in dry color manufacture, as carried out at Pittsburgh Plate Glass Company's Corona plant, in Milwaukee, Wis., are shown in these photographs. The Corona plant makes four basic colors: red, yellow, green and blue; but there are many variations and shades of these colors obtained by proper blending. Yellows are produced in greatest quantity, followed by greens and reds.



6 A revolving blender mixes the colors in the proportions calculated in the laboratory. A full hour's mixing assures uniformity.



7 The blended color is again ground to reduce it to a fine powder. The finished product is checked against standard color slides.



8 After final laboratory tests are completed, the finished dry pigments are bagged and barreled for storage and shipment.

Exposition Committee

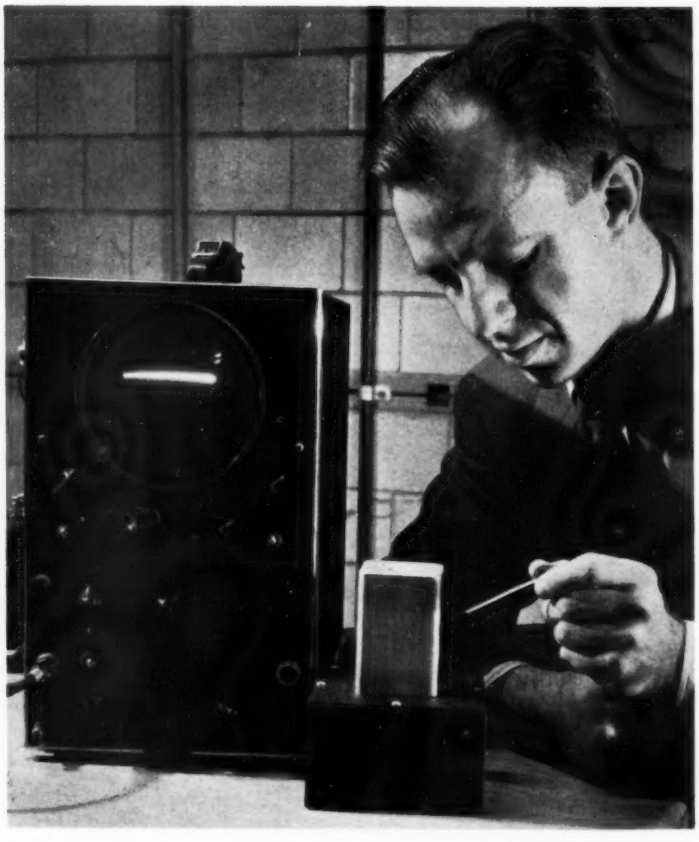
The Pacific Chemical Exposition Committee meets to make final plans for the Exposition, which will be held in the San Francisco Civic Auditorium October 21 to 25. Left to right, seated are L. R. Gardner, California Spray Chemical Corp.; Richard Wistar, Mills College; M. W. Hinson, Exposition manager; P. H. Williams, Shell Development Co., chairman; T. K. Cleveland, Phila. Quartz Co. of Calif.; F. D. Tuemmler, Shell Development Co.; G. L. Parkhurst, Oronite Chemical Co.; and J. R. Matchett, Western Regional Research Laboratory. Standing, D. W Baldra and S. L. Redman, Redman Scientific Co.; W. B. Petersen, Braun-Knecht-Heiman Co.; and Merle Randall, Randall and Sons. Not present were members of the Committee Robert Matteson, California Research Corp.; T. D. Stewart, U. of Calif.; James Clayton, California Research Corp.; J. E. Hedrick, Shell Chemical Corp.; B. P. Geyer, Shell Development Co.; and W. J. O'Connell, Jr., W. J. O'Connell and Associates.

Atomic Detective

Radiations from exploding atoms are counted at the rate of 100,000 each second by this "atomic ray detector" shown in action here with Dr. Fitz-Hugh B. Marshall of the Westinghouse Research Laboratories. The new detector is fifty times more effective than the standard Geiger counter, which chokes up after 2,000 radiations a second have been reached.

Dr. Marshall holds a small piece of wire tipped with radioactive material a few inches away from the detector, which is enclosed in the small light-tight box in the foreground.

Particles from the exploding atoms penetrate the box and enter the detector, where they strike a fluorescent screen producing light which is converted to electricity and amplified 1 million times by a photomultiplier tube. This signal then is transmitted to the oscilloscope where the exploding atoms appear as flashing peaks of light. The new detector is still in the experimental stage.



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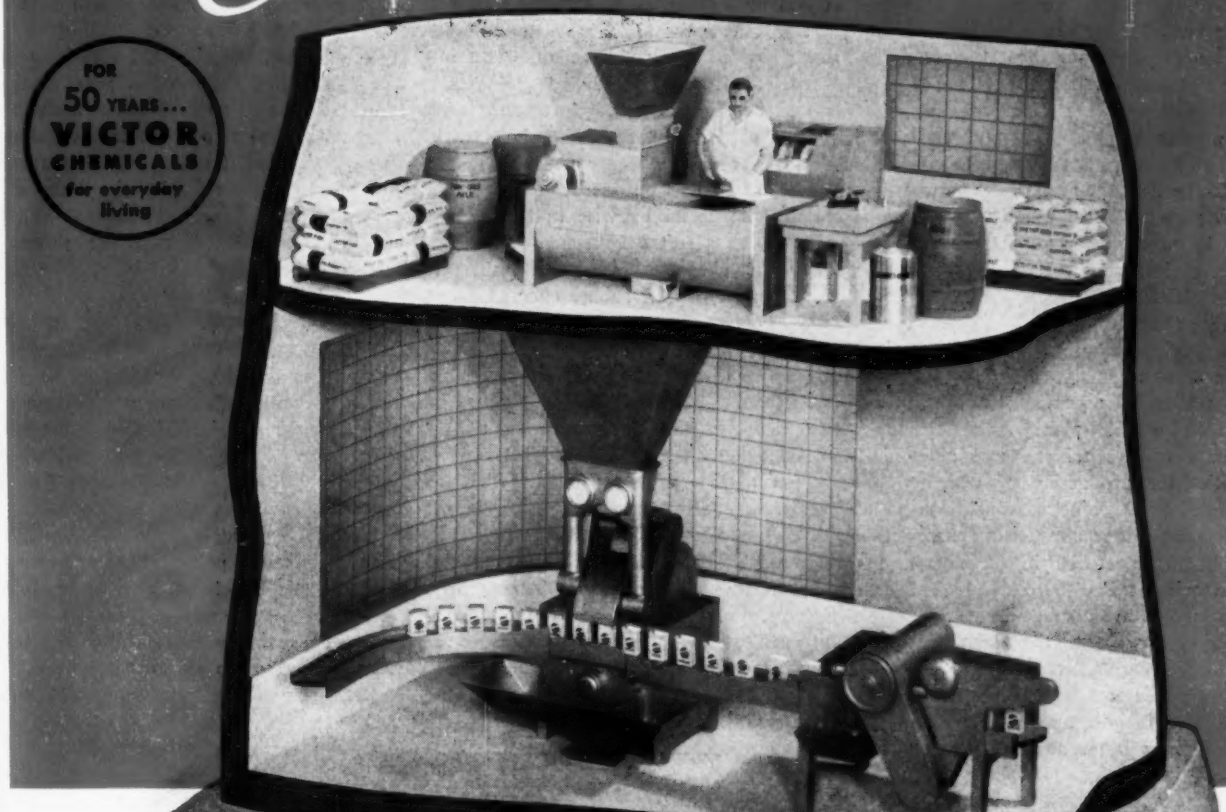

for... FOODS

VICTOR CHEMICAL WORKS

Victor Phosphates play important and varied roles in the manufacture and enrichment of food products. Cereals, flour, prepared mixes, and food beverages, for example, are enriched with essential calcium, phosphorus, and iron by the addition of Victor Calcium and Iron Phosphates. Calcium phosphates also provide the necessary leavening acid in prepared flour mixes. Disodium phosphate serves as an emulsifier in the production of process cheese and condensed milk. ¶ Victor chemicals employed in the food industry include: **Ammonium Phosphates** (yeast, vinegar, yeast food), **Dicalcium Phosphate** (mineral fortification), **Disodium Phosphate** (process cheese, condensed milk), **Hicalcium Phosphate** (calcium-enriched flour and bread), **Iron Phosphates** (mineral enrichment), **Monocalcium Phosphate** (mineral supplement, leavening acid, baking powder), **Phosphoric Acid** (yeast, sugar, soft drinks, imitation jellies, gelatine), **Sodium Acid Pyrophosphate** (acid ingredient in commercial baking powders, prepared doughnut and cake flours), **Tricalcium Phosphate** (conditioning salt, soda, and powdered sugar).

VICTOR CHEMICAL WORKS, 141 W. Jackson Blvd., Chicago 4, Ill.

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NEW PRODUCTS & PROCESSES

Pilot-Plant Benzonitrile NP 511

LIMITED quantities of benzonitrile, a versatile chemical intermediate, have become available for study by research investigators and development engineers with announcement recently by the Socony-Vacuum Oil Company, Inc., of the placing in operation of a semi-commercial plant for its manufacture.

Socony-Vacuum research experts foresee a wide usage of the material, which may be used in the production of synthetic resins, pharmaceuticals, and dyestuffs. Lack of benzonitrile in sufficient quantities heretofore has limited complete development of the material's entire range of usefulness.

In setting up manufacture of benzonitrile on a pilot-plant scale, Socony-Vacuum utilizes toluene and ammonia, facilities for production of which were expanded greatly during World War II.

The pilot-plant quantities of benzonitrile will be manufactured in the company's laboratories at Paulsboro, N. J. Toluene and ammonia are combined chemically in the vapor phase with the assistance of a catalyst.

Benzonitrile is a high-boiling, colorless liquid with a pleasant odor resembling that of oil of bitter almonds. It boils at 375° F., weighs 8.35 lbs. per gallon, and freezes at 9° F. It is soluble in common organic solvents such as alcohol, carbontetrachloride and ether and is essentially insoluble in water.

In Germany the material has been reacted with dicyandiamide to form benzoguanamine, basis of a melamine-type resin which is said to give better gloss and heat stability to lacquers than conventional melamines.

Socony-Vacuum research experts said benzonitrile also may have important insecticidal properties, although this phase remains to be explored further. However, they added that it is a solvent with definite promise where conventional solvents are ineffective, as for vinyl resins. It may be useful likewise in the rubber industry as a softening agent for natural rubber as well as an intermediate in the development of new rubber chemicals.

2-Mercapto-4,6,6-trimethyl Thiazine NP 512

A new organic chemical offered by B. F. Goodrich Chemical Co. is 2-Mercapto-4,6,6-trimethyl thiazine (M.T.M.T.), a yellow, crystalline material, insoluble in water but soluble in ketones and esters. Heterocylic in nature, M.T.M.T. reacts as a tautomeric compound with the active hydrogen atom shifting from sulfur to nitrogen as the reaction conditions are changed. Esters, metal salts and other derivatives are prepared readily and in good yields. M.T.M.T. is easily dimerized and the dimer itself is quite reactive.

2-Methyl-1,3-Pentanediol NP 513

A new glycol, 2-methyl-1,3-pentanediol, is now available. It is a dihydric alcohol with an unusual structure, which is expected to find wide industrial use in soaps, detergents, softeners, and penetrants, in oils, hydraulic fluids, greases and lubricating oils, and as a plasticizer and coupling agent for resin solutions and printing inks.

Containing one primary and one secdary hydroxy group, the substance has unusual solubility for a wide variety of resins and is miscible with most common organic solvents. Its high boiling point (215° C.) plus limited solubility in water (10 parts glycol in 100 parts water) give it a combination of properties not found in any other glycol now in use in the above applications.

In addition, the chemical reactivity of the hydroxy groups makes possible the synthesis of various derivatives useful as plasticizers and also suggests the use of methyl-pentanediol as a modifying agent in the alkyd resin field. The manufacturer, Celanese Chemical Corp., is offering experimental quantities for product evaluation.

Polyester Plasticizer NP 514

Paraplex RG-10, an addition to its series of versatile alkyd-type, polymeric plasticizing resins, and intended for use with nitrocellulose, urea and melamine resins, is offered by the Resinous Products & Chemical Co.

The new, extremely flexible, highly efficient, oil-modified polyester is low in cost, possesses light color, improved alcohol tolerance, greater solvency for nitrocellulose, unusual pigment stability and increased adhesion to vulcanized rubber. It resists ultra violet light and does not spew even at temperatures as high as 325° F.

Due to its color, durability and flexibility, Paraplex RG-10 is recommended in high quality nitrocellulose coated fabrics, in white lacquer for use on rubber articles and in tough, oil-resistant cable coverings.

Emulsifiable Waxes NP 515

Two new emulsifiable petroleum waxes, white and light yellow, are being sold under the brand name Intawax.

Tests yield these average results: melting point, 187° F.; acid value, 31; saponification value, 83; and penetration (100 grams at 77° F.), 6.

They are available from International Wax Refining Corp., 4415 Third Ave., Brooklyn, N. Y., at 39½ cents per pound for the light yellow and 47 cents per pound for the white.

Protection for Bright Metal Surfaces NP 516

A new, protective, liquid-plastic coating for polished or bright metal is called "Redskin." The coating is applied simply by spray, brush or dipping on bright metal surfaces. It dries quickly forming a tough, elastic film that is impervious

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (9-7)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP 511	NP 514	NP 517	NP 520
NP 512	NP 515	NP 518	NP 521
NP 513	NP 516	NP 519	

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Name ..... (Position) .....

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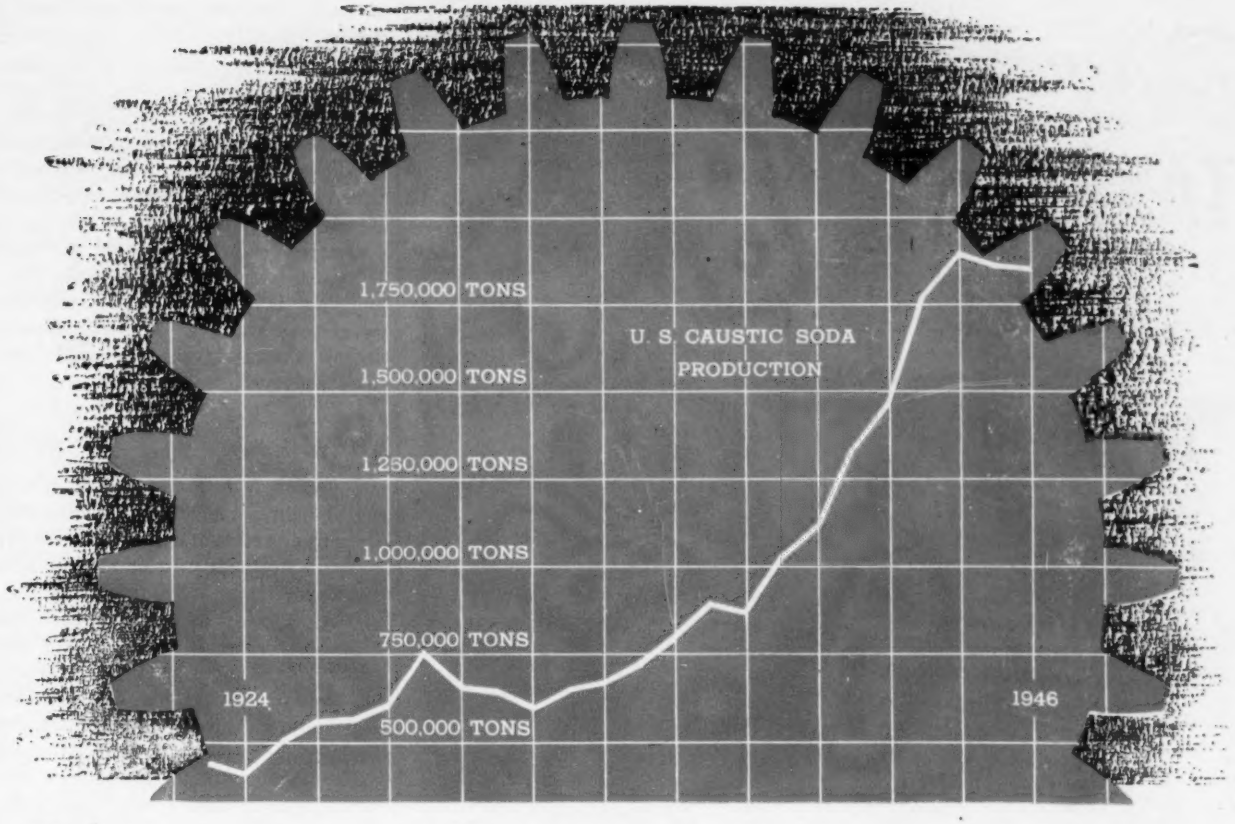
Street .....

City .....Zone.....State .....

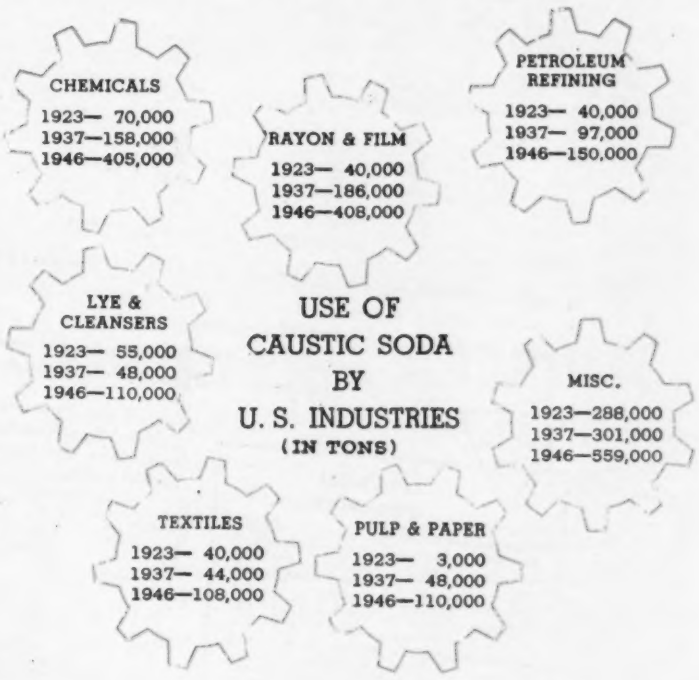


In gear with American Progress

The huge increases in volume and the vastly superior quality of American production of Paper, Rayon, Textiles, Chemicals, Soap, Petroleum and numerous other essentials are reflected in the records of alkali manufacture. Caustic Soda, for example, is identified with basic processes in all of these industries. Its production figures are indicative of the close ratio to those of leading American industries.

Columbia, since the turn of the century, has been one of the nation's leading producers of Caustic Soda, other basic alkalies and related products . . . in support of the constant progress of its customers.

Pittsburgh Plate Glass Company • Columbia Chemical Division, Fifth at Bellefield, Pittsburgh 13, Penna. . . . Chicago • Boston • Cleveland • New York • Cincinnati • St. Louis • Minneapolis • Charlotte • Philadelphia • San Francisco



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Reagent Quality in TANK CAR LOTS

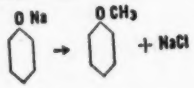
UTILIZATION OF ANSUL CH_3Cl

These examples illustrate a few specific applications for Ansul Methyl Chloride in research laboratory and industrial practices:

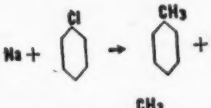
GRIGNARD . . . . . $CH_3Cl + Mg \rightarrow CH_3MgCl$

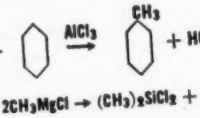
QUATERNARIES . . . . $CH_3Cl + RNH_2 \rightarrow$ Cl^-

ALIPHATIC ETHERS . $CH_3Cl + NaOR \rightarrow CH_3-O-R + NaCl$

AROMATIC ETHERS . $CH_3Cl +$  $+ NaCl$

ALIPHATIC HYDROCARBONS . . . $CH_3Cl + RNa \rightarrow CH_3-R + NaCl$

AROMATIC HYDROCARBONS . . . $CH_3Cl + Na +$  $+ NaCl$

" " . . . $CH_3Cl +$  $+ HCl$

SILICONES . . . . . $SiCl_4 + 2CH_3MgCl \rightarrow (CH_3)_2SiCl_2 + 2MgCl_2$

In addition Ansul Liquid Methyl Chloride is being currently used as a low temperature solvent • propellent solvent • extractant • refrigerant • **and in other laboratory and industrial processes.**

Methyl Chloride is a low priced chemical available in tank cars and large and small cylinders.

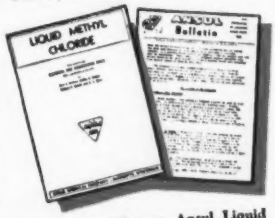
LIQUID Methyl Chloride ANSUL®

PHYSICAL PROPERTIES

Chemical formula	CH_3Cl
Molecular weight	50.491
Color (gas or liquid)	Colorless
Odor	Ethereal, non-irritating
Melting point	−144° F. (−97.6° C.)
Boiling point	−10.65° F. (−23.7° C.)
Critical Temperature	289.6° F. (143.1° C.)
Critical pressure	969.2 lbs. per sq. in. abs.
Solubility	Methyl chloride in water—3 to 4 volumes methyl chloride vapor in 1 volume of water at ordinary temperatures and atmospheric pressure—methyl chloride in alcohol —readily soluble.
Specific gravity of liquid	.909

*REG. U. S. PAT. OFF.

Consult Ansul's research and technical departments on these and other applications of Methyl Chloride.



Write for treatise on Ansul Liquid Methyl Chloride and request bulletins describing the specific application in which you are interested.

For your SULFUR DIOXIDE *applications . . . . Use* ANSUL SULFUR DIOXIDE

ANSUL CHEMICAL COMPANY
INDUSTRIAL CHEMICALS DIVISION, MARINETTE, WIS.
60 E. 42nd St., New York — 535 Chestnut St., Philadelphia

to rust, chemical reaction, smears, or normal handling.

Red in color, it instantly warns against promiscuous rough handling. To uncover the bright surface, the edge is picked up with the finger nail and the coating peeled off in one continuous strip. Parts protected with this new coating may be completely fabricated before removing the protective "skin." Assembled items may be coated for storage or for protection in shipping. It is not affected by atmosphere or climatic changes. The manufacturer, Dennis Chemical Co., can make immediate delivery.

Alkyd Resin NP 517

Duraplex ND-78 is a new non-oxidizing phthalic alkyd resin with high alkali resistance, excellent color retention, and compatibility with urea or melamine formaldehyde resins and nitrocellulose.

Used in combination with such urea formaldehyde resins as Uformite F-200E or MM-55, Duraplex ND-78 forms vehicles particularly suitable for white baking enamels for washing machines, hospital equipment, stoves, kitchen cabinets and other applications where high alkali resistance and color retention are essential.

When used with nitrocellulose, Duraplex ND-78 produces high quality lacquers for furniture, automotive use and on metals requiring general purpose pigments or clear coatings.

It is a product of Resinous Products & Chemical Co.

2,4-D Solubilizer NP 518

Two amines for solubilizing 2,4-D are Sharsol 221 (especially prepared for the formulation of 40 per cent 2,4-D) and Sharsol 193 (recommended for higher concentrations). With the latter 60 per cent solutions can be made.

These highly concentrated solutions have very low freezing points (—42° C.), need no thinners, and may be made without the use of steam since the heat of reaction is sufficient for processing. They are made by Sharples Chemicals, Inc.

Electropolishing Solution NP 519

The Du Pont Company has placed on the market a new electropolishing solution for brightening stainless steel and nickel alloys. It is not effective for carbon-steel, brass, and bronze. The solution is sold pre-mixed ready for use.

This solution remains liquid at room temperature and does not require maintaining an elevated temperature during shut down of the bath. The bath is easily controlled and may be operated by non-technical personnel. Equipment for use with this solution is substantially the same as that used in electroplating. The bath operates in the current density range 0.5

Build the complete system . . .
pipe . . . fittings . . . valves . . .
Type FC flexible coupling
"Karbate" valve
Type V flanged connection
Type V nipple
Cross
45° elbow

OF "KARBATE" IMPERVIOUS GRAPHITE

FOR CONVEYING, processing, and storage of corrosive fluids, whole systems are now built 100% of "Karbate" impervious graphite. Complete equipment is available – the pipe itself, fittings, valves, pumps, heat exchangers, towers – for processing HF, HCl, H_2SO_4, and many other chemicals.

This lightweight equipment is easy to install. The pipe is readily cut and fitted in the field.

Standard "Karbate" pipe sizes range from 1" to 10" i.d. A full assortment of fittings can be shipped for each size. All parts made of "Karbate" impervious graphite are strong . . . immune to thermal shock . . . and offer the highest resistance to corrosion of any practical high heat-transfer material.

For additional information on "Karbate" impervious graphite for handling corrosive fluids, write to National Carbon Company, Inc., Dept. **CI.**

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Unit of Union Carbide and Carbon Corporation

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WE'VE DONE IT FOR EMBALMERS . . . . .

THERE are odors worse than that of formaldehyde . . . but you wouldn't care to smell them! Nor did embalmers really enjoy working with their formaldehyde solution-embalming fluids before FRITZSCHE chemists found a way to mask their harsh, acrid odors. Now, thanks to a remarkably effective group of odor neutralizers developed in our laboratories especially for formaldehyde odor-control, and known to the trade as ALDAROMES, embalmers can go about their accustomed duties without any of their former discomfort. Which suggests that—having done this for embalmers—

PERHAPS WE CAN DO IT FOR YOU!

Yours may not be as serious a problem as the embalmer's, but it may be a source of annoyance or inconvenience just the same. For that reason it might pay you to consult our Technical Perfume Division whose special function is to find an economical answer to your industrial odor problem. Chances are we can supply from stock an efficient, time-tested modifier that will quickly solve the odor problem now confronting you. Why not write us in detail and let us try?

FRITZSCHE *Established* 1871 *Brothers, Inc.*

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amperes per square inch to 4 amperes per square inch, and in the temperature range 170° to 190° F. The time required to produce a bright finish is from 2 to 10 minutes.

This new solution provides the metal finisher with a new and economical method of producing a bright finish which would otherwise require costly mechanical polishing and buffing operations. The prepared solution may be obtained from the Electrochemicals Department District Offices of the E. I. du Pont de Nemours & Co., Inc.

Colloidal Clay NP 520

"Attasol" is Attapulgus Clay Co.'s trade name for a new colloidal form of the mineral attapulgite, a complex hydrated magnesium-aluminum silicate which is the principal mineral constituent of the Georgia-Florida fullers earth clays, long known for their high adsorptive powers. Attasol, however, differs from previous commercially available forms of attapulgite in that it disperses readily in aqueous media and can be made to form stable viscous suspensions with gel-forming properties. Colloidal dispersions of this substance are not flocculated by electrolytes and exhibit adsorptive and detergent powers to a considerable extent.

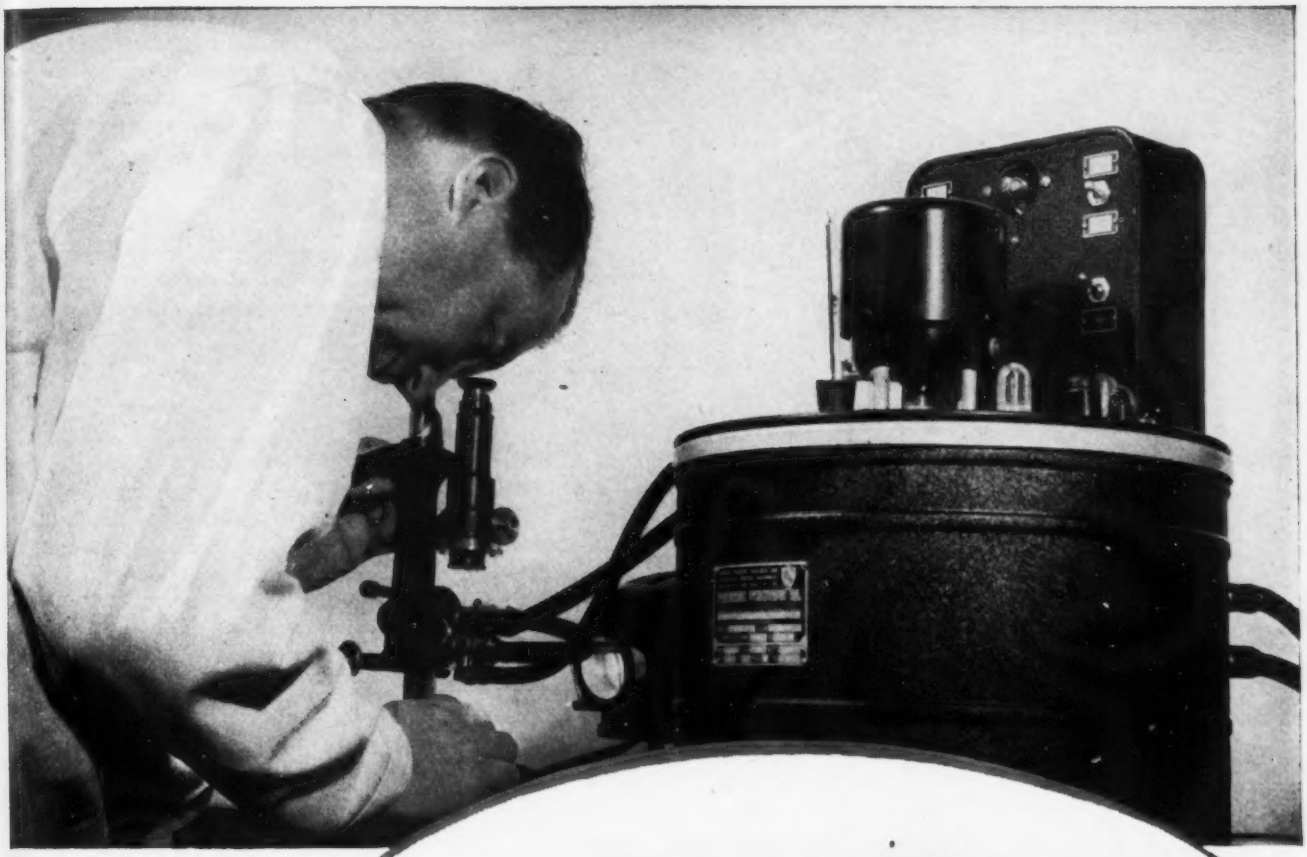
Attasol is a flowable, white, nonabrasive powder that has a bulk density of about 30 pounds per cubic foot. The electron microscope shows its particles to be slender, elongated fibres or spicules. It is chemically inert to most reagents and depends on surface energy and sorptive action for its effectiveness.

When used in distilled water, the pH lies between 6.5 and 7.5. In media whose pH differs from neutrality there may be some change in pH due to Attasol's sorptive action, indicating its use for precision control of pH. The presence of salts, acids or bases have relatively little effect on Attasol dispersions.

As a washing powder, Attasol is compatible with caustic soda, soda ash, silicates and phosphates used as adjuncts in washing severely soiled fabrics, and may be used in place of all or part of the soap customarily employed.

The surface activity of Attasol and the stability of its gels suggest uses as a frothing, flotation and emulsifying agent, with special values where an electrolyte makes up a major phase of an emulsion. The viscosity and densities obtainable with water dispersions suggest Attasol gels as excellent mediums for highly selective flotation.

Other uses include: conditioner for molding sands; filler in rubber goods, plastics, adhesives; both filler and coating in paper making; inert vehicle, pigment acceptor or filler in the manufacture of ceramics, soaps, paints and enamels; colloidal adsorbent for plant foods in hydro-



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It's his job to give you better resins than ever before at prices that are *right* . . . helping you put out top quality coatings at lower cost. And in today's increasingly competitive market—*that means sales!*

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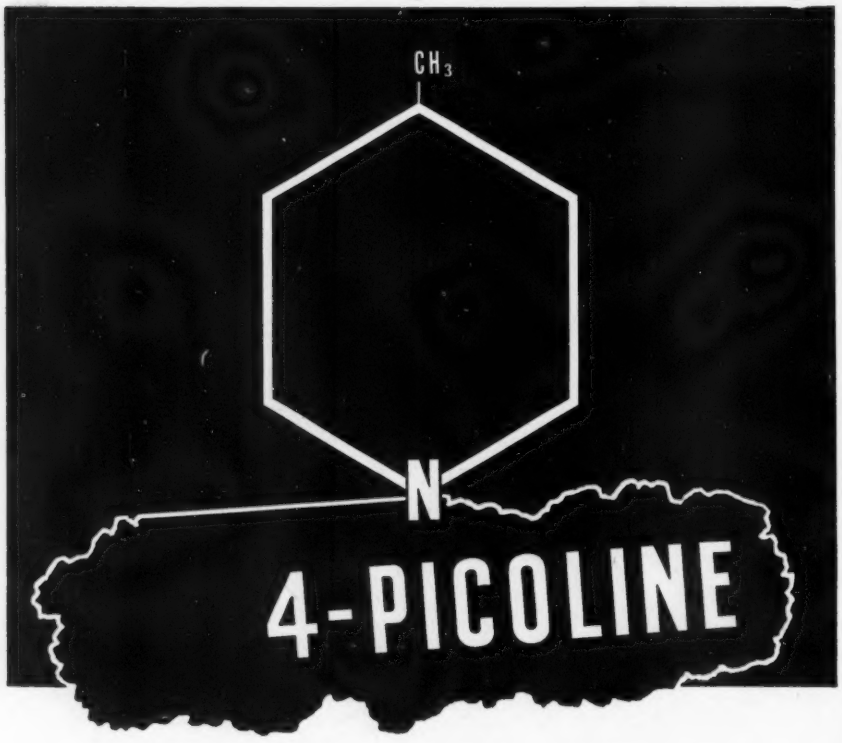

An Alkylpyridine With Many Interesting Properties

● Recent studies indicate that pyridine compounds having an alkyl group in the 4-position possess superior activities as medicinals, fungicides and insecticides.

One of these compounds, Reilly 4-Picoline, is readily oxidized, condenses freely with aldehydes, and forms quaternary salts with remarkable ease.

Research laboratories interested in the development of new pharmaceuticals, insecticides, anti-oxidants and rubber chemicals will find it well worth their while to investigate Reilly 4-Picoline.

Other Reilly Alkylpyridines are 2-Picoline, 3-Picoline, 2,6-Lutidine, 2,4-Lutidine, 2,4,6-Collidine, 2-Methyl-5-Ethylpyridine, 2-Amylpyridine, 4-Amylpyridine, 2-(5-Nonyl) pyridine, and 4-(5-Nonyl) pyridine.

Your inquiries on any of these compounds will have prompt attention.

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Reilly Coal Tar Chemicals For Industry

ponics; clarifying agent for foods and water; carrier and base for drug, pharmaceutical or cosmetic products. For these and many other uses, Attasol's acceptance and retention of pigments, dyes, and inks, and its chemical inertness should be of particular value.

Glass Ink NP 521

Glink, a permanent ink which adheres to glass, marble, china, porcelain or ceramics, is non-corrosive, non-poisonous and non-inflammable.

No special applicators are required, as it may be applied with an ordinary writing pen or fine brush. Unlike diamond ink, special wax containers are not necessary, and the ink may be kept in cans or bottles. After the ink has dried, it is not affected by any of the common laboratory solvents such as alcohol, acetone, turpentine, toluene, ethylene dichloride, carbon tetrachloride, ether or chloroform. It also resists the action of severe corrosive agents such as sulfuric acid, hydrochloric acid, nitric acid, sodium hydroxide, salt solution and soapy water.

In the laboratory, it can be used to identify glass negatives, lantern slides, enameled trays, and microscopic slides. In the paint and varnish laboratory, the ink is used to identify Gardner-Holdt Tubes or R.P.C. Viscosity tubes. In other shops, it is used as a permanent marking for reagent bottles. "Glink" can be used to fill the graduation marks in thermometers. By the addition of a small amount of glycerine, it is possible to use the ink with a rubber stamp.

Prices range from $1.00 per pint to $10.00 per drum. It was developed by Stewart Research Laboratory.

Interesting Patents

PRODUCTION OF ACRYLONITRILE consists in reacting anhydrous acetylene with anhydrous hydrocyanic acid gas at 850° F. to 1150° F. in presence of potassium cyanide deposited on magnesium oxide. No. 2,414,762. John Owen and Charles Kimberlin, Jr. to Jasco, Inc.

MAKING CYCLOBUTANE, consists in subjecting cyclopentanone in vapor stage to irradiation by visible and ultra-violet 350° C. and 10 to 200 mm. of mercury. No. 2,414,880. George Kistiakowsky and Sidney Benson to Godfrey L. Cabot, Inc.

PREPARING 2,5-DICHLORODIOXANE, comprises chlorinating dioxane directly at temperatures below 10° C. No. 2,414,982. William Smedley.

PREPARING 2,5-DICHLORODIOXANE, comprises passing dry hydrogen chloride into solution of dioxadiene in non-aqueous organic solvent substantially inert to hydrogen chloride. No. 2,414,989. Robert Umhoefer.

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(*Continued from page 432*)

4-CHLORO-o-TOLOXYACETIC ACID

$CH_3(Cl)C_6H_3OCH_2COOH$. Mol. Wt., 200.62. Cream colored powder. M. P. 116-118° C. Uses: Plant growth control. Available in experimental quantities. The Dow Chemical Co.

δ-CHLOROVALERONITRILE

$ClCH_2CH_2CH_2CH_2CN$. Mol. Wt., 117.5. B.P., 98°C at 15 mm. Colorless liquid. Use: Intermediate. Available in research quantities. Bios Laboratories.

δ-CHDOROVALERONITRILE

$ClCH_2CH_2CH_2CH_2CN$. Mol. Wt., 117.579. B.P., 218°C. at 760 mm. Sp. Gr., 1.056 at 20°/4°C. R.I., N20/D, 1.4470. Flash pt., 90°C. Colorless to pale yellow mobile liquid with a mild odor. Insoluble in water. Soluble in most common organic solvents. Use: As a chemical intermediate in the preparation of sodium delta-hydroxyvalerate, delta-chlorovaleric acid, and bis-4-cyanobutyl sulfide, which can be made to yield a variety of products by oxidation, reduction, hydrolysis, and alcoholysis. Available in experimental quantities. E. I. du Pont de Nemours & Co., Inc.

CHROMIUM (ic) FORMATE

$Cr(COOH)_3$. Mol. Wt., 187.064. Green powder. Very soluble in water. City Chemical Corp.

COBALT MOLYBDATE

$CoMoO_4.H_2O$. Mol. Wt., 236.91. Violet crystals or powder. Slightly soluble in water. Result upon heating above 450°C gives a green anhydrous substance. City Chemical Corp.

CHROMIUM (ic) TUNGSTATE

$Cr_2(WO_4)_3.20\ H_2O$. Mol. Wt., 1208.18. Green amorphous powder. Insoluble in water, soluble in ortho Phosphoric Acid. City Chemical Corp.

COBALT TRIFLUORIDE

CoF_3. Mol. Wt., 115.94. Total fluorine content, 49.16%. Available fluorine. 16.39%. Bulk density, 1.5 gr./cc.(approx.). Sp. Gr., 3.88 at 25°C. Odor, none, except HF odor developed in moist air. Color, light brown. State, fine, free flowing powder. Stable in sealed containers. Reacts readily with moisture in the atmosphere to form a dark, almost black powder. Reacts with water to form a black, finely divided precipitate. As a fluorinating agent, yields one atom of fluorine and reverts to the difluoride. Uses: Fluorinating agent. The spent cobalt difluoride may be regenerated with elemental fluorine. Available in limited quantities. Pennsylvania Salt Mfg. Co.

COPPER IODIDE

CuI. Mol. Wt., 190.49. Sp. Gr., 5.653/15°C. M. P. 628°C. Yellow powder, insoluble in water, soluble in Alkali Cyanides and Thiosulfates. Use: Medicinal—(unofficial). City Chemical Corp.

COPPER PHTHALATE

$C_8H_4O_4Cu$. Mol. Wt., 227.5. Bulk density, 25 lb. cu. ft. Assay, minimum 95%. Fine blue powder. Insoluble or very slightly soluble in common organic solvents or water. Uses: Fungicide. Availability: Pilot plant quantities. Monsanto Chemical Co.

CUPRIC LACTATE

$Cu(C_3H_5O_3)_2.2H_2O$. Mol. Wt., 277.68. Greenish blue crystals or granular powder, soluble in 6 parts cold and 2 parts boiling water. Use: As a source of copper in copper plating. Available in commercial quantities. Chemo Puro Mfg. Corp.

w-CYANOPELARGONIC ACID

$NC(CH_2)_8COOH$. Mol. Wt., 184. M.P., 48°C. Colorless crystalline solid. Use: Intermediate. Available in research quantities. Bios Laboratories.

CYANURIC ACID

$C_3H_3O_3N_3$. Mol. Wt., 129. M.P., over 360°C. Colorless crystals. Slightly soluble in water and alcohol. Insoluble in the common organic solvents. Use: Intermediate for the manufature of pharmaeuticals and fine chemicals. Available in commercial quantities. Bios Laboratories.

CYANURIC CHLORIDE

$C_3N_3Cl_3$. Mol. Wt., 184.4. M.P., 146°C. B.P., 190°C. Colorless crystals of sharp penetrating odor. Use: Chemical intermediate. Available in commercial quantities. Bios Laboratories.

CYCLOHEPTANONE (Suberone)

$C_7H_{12}O$. Mol. Wt., 112.2. B.P., 179°C. Colorless oil of peppermint odor. Use: Research and intermediate. Available in pilot plant quantities. Bios Laboratories.

CYCLOHEXANEETHANOL

$C_6H_{11}CH_2CH_2OH$. Mol. Wt., 144.2. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

CYCLOPENTANOL

$CH_2CH_2CH_2CH_2CHOH$. Mol. Wt., 86.08. R.I., 1.4513. Density, 0.9488. B.P., 139-140°C. Oily liquid slightly soluble in water; soluble in alcohol. Chemical properties are those of a secondary alcohol. Uses: The synthesis of dyes, pharmaceuticals and other organic chemicals. Columbia Organic Chemicals Co., Inc.

CYCLOPENTANONE

C_5H_8O. Mol. Wt., 84.1. B.P., 130°C. Colorless, oily liquid. Very slightly soluble in water. Soluble in alcohol and ether. Use: Intermediate. Available in commercial quantities. Bios Laboratories.

CYCLOPENTYLBROMIDE

C_5H_9Br. Mol. Wt., 148.99. R.I. 1.4875. Density 1.365. Oily liquid having odor similar to camphor. Insoluble in water. Chemical properties are those of a secondary alkyl bromide. Use: Organic synthesis. Columbia Organic Chemicals Co., Inc.

DECAMETHYLENEDIAMINE

$H_2N(CH_2)_{10}NH_2$. Mol. Wt., 172. M.P., 60°C. B.P., 140°C. at 12 mm. pressure. Colorless liquid. Use: Intermediate for drugs, fine chemicals, and high polymer compounds. Available in semi-commercial quantities. Bios Laboratories.

DECAMETHYLENEIMINE

$C_{10}H_{21}N$. Mol. Wt., 155. B.P., 104°C. at 16 mm. pressure. Oily liquid. Use: Chemical intermediate. Available in research quantities only. Bios Laboratories.

DIALLYL BENZENEPHOSPHONATE (Monomer)

$C_6H_5P(O)(OCH_2CH{=}CH_2)_2$. Mol. Wt., 238. Sp. Gr., 1.112 at 25° C. R.I., 1.5106. B.P., 126-128°C. at 1 mm. Viscosity, 8.5 cp. at 25°C. Colorless liquid. Slight odor at room temperature. Soluble in common organic solvents. This monomer is polymerized by heat and peroxide catalysts to a hard, clear, flameproof, thermosetting resin. Density, 1.273. R.I., 1.573. The monomer can be compatibly copolymerized with methyl methacrylate, vinyl acetate, diallyl phthalate and various unsaturated polyesters to hard, clear thermosetting resins. The incorporation of 30-40% by weight of the monomer imparts self-extinguishing characteristics to its copolymers, and increases their heat distortion temperatures. It has the unusual ability to wet glass fibers. The high refractive index of the monomer and its compatibility with materials of lower refractive index, such as methyl methacrylate, make possible the formulation of resins with varying refractive indices. Refractive indices of ordinary glass formulations (N_D 1.50 — 1.57) can be covered. This factor, coupled with the ability to wet glass fibers permits the fabrication of strong, nearly transparent glass laminates. Uses: As an additive to commercial resins to improve their flame resistance and raise their heat distortion temperatures. A non-inflammable thinner for high viscosity unsaturated polyesters for improved impregnation of fillers. A general purpose additive to commercial resins for use in making contact pressure laminates. Available in experimental quantities. Victor Chemical Works.

DIALLYL BENZENEPHOSPHONATE (Prepolymer)

Sp. Gr., 1.155 + at 25° C. R.I., 1.528 +. Viscosity 1000 — 3000cp. at 25° C. A water white to yellow, clear viscous liquid. Slight odor at room temperature. This partial polymer can be polymerized by heat and peroxide catalyst to a hard, clear, self-extinguishing thermosetting resin. Catalysts are readily dissolved by stirring at room temperature. Tank life (without catalyst) is greater than four months at room temperature. It can be compatibly copolymerized with methyl methacrylate, vinyl acetate, diallyl phthalate and various unsaturated polyester alkyds. It imparts self-extinguishing characteristics to its copolymers when present at from 30 — 40% by weight. Uses: As an additive for commercial unsaturated polyester resins used in contact and low pressure laminating to improve heat distortion values and flame resistance. To increase the viscosity of low viscosity monomers such as methyl methacrylate and vinyl acetate for casting or laminating purposes. Available in experimental quantities. Victor Chemical Works.

3,5-DIAMINOPHENOL.2HCl (Technical)

$(NH_2)_2C_6H_3OH.2HCl$. Mol. Wt., 197.07. M.P., decomposes. No odor. Yellow to tan crystals. Chemical properties: A fairly stable compound as the diacid salt; decomposes slowly in free base form. Uses: Resin component; dye intermeriate; photographic developer; intermediate in manufacture of gasoline antioxidants. Available in research and commercial quantities. The Edwal Laboratories, Inc.

o,o'-DIBENZAMIDODIPHENYL DISULPHIDE (Pepton 22)

$C_{26}H_{20}O_2N_2S_2$. Mol Wt., 442.16. Sp. Gr., 1.35 (approx.). Melting Range 136 to 143°C. Odor, practically none. Color, very light buff. Catalytic or chemical plasticizer for natural, synthetic and reclaimed rubbers. Effective in low concentrations (0.05% to 3%) at mill or Banbury temperatures 240°F. to 350°F. Has practically no effect on curing or aging properties of stocks. Does not bloom nor discolor. Apparently has no toxic effects when used with usual precautions for handling rubber chemicals. Available in commercial quantities. Calco Chemical Division, American Cyanamid Co.

DIBROMOMALONIC ACID

HOOC-CBr_2-COOH. Mol. Wt., 262. Light yellow needles or prisms. M.P., 147°C. dec. Use: Intermediate for drugs and fine chemicals. Available in semi-commercial quantities. Bios Laboratories.

DIBROMOMALONYL CHLORIDE

$ClOCCBr_2COCl$. Mol. Wt., 299. B.P., 75-77°C. (15 mm.). Yellowish oily liquid. Use: Chemical intermediate. Available in semi-commercial quantities. Bois Laboratories.

1,5-DIBROMOPENTANE (Pentamethylene Dibromide)

CH_2Br-CH_2-CH_2-CH_2-CH_2Br. Mol. Wt., 229.97. Colorless liquid with sweet pleasant odor. Insoluble in water but soluble in most common organic solvents. Uses: Preparation of medicinals, pharmaceuticals and other organic chemicals. Available in experimental quantities. Halogen Chemicals Inc.

p-DI-tert-BUTYLBENZENE

$(CH_3)_3CC_6H_4C(CH_3)_3$. Mol. Wt., 190. Freezing P., 76.9°C. B.P., 235.8°C. (760 mm.). Bulk density 0.6. Solubility in g./100 ml. of solvent at 25°C.; alcohol (95%) 2.2; ethyl ether 55; benzene 75; carbon tetrachloride 95; water nil. Solubility at 65°C., alcohol 34; benzene 420; carbon tetrachloride 585. Chemical properties: With acetylchloride, p-tert-butylacetophenone is produced. Oxidation gives either terephthalic acid or 2,5 di-tert-butylquinone-1,4. Nitration yields 2,6 dinitro-1,4 di-tert-butylbenzene. Sulfonation gives the corresponding sulfonic acid from which the phenol may be produced. Corresponding sulfamide can be produced by usual reactions. Chlorine can be introduced into the tert-butyl groups. One of the tertiary butyl groups is subject to transfer reactions. Uses: Intermediate in the chemical, dyestuff, plastics, paint, synthetic fibre, textile, perfume, and other industries. Standard Oil Co. (Indiana).

DIBUTYL DIPHENYL TIN

$(CH_3CH_2CH_2CH_2)_2Sn(C_6H_5)_2$. Mol. Wt., 387, contains 30.7% Sn. Clear, slightly greenish liquid. B.P., 175° at 2 mm., R.I., 1.563 at 17.5°C. Density 1.19. Available in pilot plant quantities. Metal & Thermit Corp.

DIBUTYL TIN DICHLORIDE

$(CH_3CH_2CH_2CH_2)_2SnCl_2$. Mol Wt., 303.8. Contains 39.1%Sn, 23.3%Cl; white needles. M.P., 43°; B.P., about 135° at 10 mm. Density, liquid, about 1.36 at 50°. R.I., at 51°, 1.4991. Available in pilot plant quantities. Metal & Thermit Corp.

DIBUTYL TIN DILAURATE

$(CH_3CH_2CH_2CH_2)_2Sn(OOC(CH_2)_{10}CH_3)_2$. Mol. Wt., 631.5. Contains 18.8% Sn; clear, slightly yellow liquid; low vapor pressure. Freezing P., (not sharp) —6 to —10°C approx. Available in pilot plant quantities. Metal & Thermit Corp.

DIBUTYL TIN OXIDE

$(CH_3CH_2CH_2CH_2)_2SnO$. Mol. Wt., 248.9. Contains 47.7% Sn. White amorphous powder. Decomposes at about 180°C. without melting. Soluble cold in DuPont alcohols B22, B24 and B27, cyclohexanol, Solvesso 3 and 100 and pine oil. Reacts with organic and inorganic acids. Available in pilot plant quantities. Metal & Thermit Corp.

1,5-DICHLOROPENTANE (Pentamethylene Chloride)

$C_5H_{10}Cl_2$. Mol. Wt., 141.04. B.P., 178°C. at 760 mm. M.P., —72.8°C. Sp. Gr., 1.102 at 20°/4°C. R.I., N20/D, 1.4563. Flash pt., 78°C. Colorless, mobile liquid with mild, pleasant odor. Insol. in water. Sol. in ethanol, ethyl ether, chloroform, carbon disulfide, benzene, petroleum ether, and most other common organic solvents. Use: As a chemical intermediate by reaction with cyanogen, amino, sulfur, and other groups; xanthate reaction products may find use in extreme pressure lubricants. Available in limited quantities. E. I. du Pont de Nemours & Co., Inc.

1,1-DICHLORO-1-PROPENE

$C_3H_4Cl_2$. Mol. Wt., 111.00. B.P., 77°C. Insoluble in water. Sweet, water-white liquid. Uses: Preparation of 1,1,1-Trifluoropropane derivatives. Addition and polymerization reactions. Available in experimental quantities. Halogen Chemicals Inc.

2,5-DICHLOROTHIOPHENE

$C_4H_2Cl_2S$. Mol. Wt., 153. B.P., 161°C. Colorless to light yellow liquid. Use: Intermediate. Available in commercial quantities. Bios Laboratories.

2,3-DICHLORPROPANOL-1

$C_3H_6OCl_2$. Mol. Wt., 128.99. B.P., 182°C. at 760 mm. Density, 1.3616. R.I., 1.485. Viscosity, 0.129 poise at 20°C. Solubility in water, 12.6% by wt. at 20°C. Available in experimental quantities. Carbide and Carbon Chemicals Corp.

DI (2-ETHYL BUTYL)-AZELATE (Plastolein X508R)

$C_9H_{13}OOC(CH_2)_7COOC_9H_{13}$. Mol. Wt., approximately 366. Sp. Gr., 20°/20°C., 0.9340. Viscosity 56 sec. Saybolt at 100°F. Color very pale yellow to water white. Flash Pt., 385°F. Fire Pt., 450°F. Freezing Pt., below —40°C. Acid Number below 1.0. Odor, faint. Stable to heat, light and hydrolysis. Uses: As plasticizer for polyvinyl chloride and copolymers as well as cellulose esters. Excellent for low temperature plasticization of vinyls. Available in commercia quantities at the present time. Emery Industries Inc.

DI-2-ETHYLHEXYL ADIPATE (Adipol 2 EH)

Mol. Wt., 370. Sp. Gr. at 20°/20°C., 0.927 ±.003. Boiling range at 4 mm., 207-214°C. Color: Max. No. 100 Pt-Co. Acidity, not more than 0.02% as acetic acid. Freezing Pt., pours at —60°C.; stiff clear gel at —70°C. Flash Pt., 377°F. Fire Pt., 445°F. R.I. at 25°C., 1.447. Viscosity at 20°C., 15.3 cps. Hydrolysis, none; Solubility in Water at 25°C., none; Solubility of water in at 25°C., 0.2%; Gasoline Solubility, Mineral Oil Solubility, Complete; True weight per gallon at 20°C., 7.73 lbs. Adipol 2 EH possesses the unusual combination of excellent electrical properties and extreme low temperature flexibility as well as being one of the most efficient plasticizers tested. It is an excellent efficient plasticizer for polyvinyl chloride and copolymers, nitrocellulose, ethyl cellulose, the various synthetic rubbers and other resins for applications requiring permanence in air aging, resistance to water extraction, extreme low temperature flexibility, excellent electrical properties, heat stability, resistance to discoloration and embrittlement by exposure to ultra-violet light, and easy processing. Ohio-Apex, Inc.

DIETHYL PHOSPHITE

$C_4H_{11}PO_3$. Mol. Wt., 138.12. B.P., 92°C. at 30 mm. Sp. Gr. at 0°/0° C., 1.0912. R.I., 25°, 1.4055. Colorless liquid. Miscible with most organic solvents except long chain aliphatics. Soluble in and gradually hydrolizes in water. Uses: As a solvent, paint remover and intermediate for synthesis. Availability: Research quantities. Monsanto Chemical Co.

1,1-DIFLUORO-2,3-DICHLORO-2-PROPENE

$CHCl{:}CCl\text{-}CHF_2$. Mol. Wt., 146.97. B.P., 89°C. Sweet, colorless liquid with sweet, pleasant odor. Uses: Preparation of organic fluorides, pharmaceuticals, difluoroacetic acid. Available in research quantities. Halogen Chemicals Inc.

DIHYDROPYRAN

$CH_2CH_2CH_2CH{:}CH$. Mol. Wt., 84.114. B. P., 86°C. at 760 mm. Sp. Gr., 0.923 at 20°/4°C. R. I., N20/D, 1.4400. Flash Pt., —15.6°C. Colorless, mobile liquid with ether-like, penetrating odor. Sol. in water, 3.0 gms. in 100 cc. at 20°C.; sol. in most common organic solvents. Use: As a chemical intermediate in the preparation of tetrahydropyran, delta-hydroxyvaleraldehyde, unique cyclic ethers, 2-halo and 2,3-dihalotetrahydropyrans, polymers and copolymers. Available in limited quantities. E. I. du Pont de Nemours & Co., Inc.

DIISOBUTYL KETONE

$(CH_3)_2CHCH_2COCH_2CH(CH_3)_2$. Mol. Wt., 142.24. Sp. Gr., 0.8089 at 20°/20° C. B.P., 168.1° C. at 760 mm. Vapor pressure, 1.7 mm. Hg at 20°C. Solubility in water, 0.06% at 20°C. Solubility of water in, 0.45% at 20°C. Flash Pt., 140°F. Excellent dispersant for organosols based on "Vinylite" resin VYNV. Resin is neither dissolved nor appreciably swelled at room temperature. Helpful as a solvent used by lacquer formulators to control evaporation rate and improve blush resistance of nitrocellulose lacquers. Available in commercial quantities. Carbide and Carbon Chemicals Corp.

DI-ISOPROPYLENE GLYCOL SALICYLATE

$HOC_6H_4\text{-}COO.CH_2\text{-}CH(CH_3)\text{-}O\text{-}CH(CH_3)\text{-}CH_2OH$. Mol. Wt., 242. The di-isopropylene glycol mono ester of salicylic acid: Density 1.16/25°C. R.I., 1.5150/25°. M.P., below —15°C. pH of 10% dispersion, 5.3. A clear light yellow liquid. Composition: 86.1% mono ester. Sap. Value 23.2% KOH. Soluble in aromatic paraffin and chlorinated solvents; in alcohols, esters and vegetable oils. Totally absorbs ultra-violet radiation in range 2800-3200Å. Uses: As an ultraviolet light absorbent to protect human skin, plastics, paints, printing inks normally affected by the ultra-violet portion of the spectrum. Colgate-Palmolive-Peet Co.

1,3-DIISOPROPYLTHIOUREA

$(CH_3)_2CHNHCSNHCH(CH_3)_2$. Mol. Wt., 160.3. Grayish white solid. M.P., 140-145°C. Use: Corrosion inhibitor. Available in commercial quantities. Sharples Chemicals Inc.

DIMETHYL DODECYLAMINE

A tertiary fatty amine which is suitable as a cationic emulsifier and as an intermediate in the manufacture of quaternary ammonium compounds. Warwick Chemical Co.

DIMETHYL GLYOXIME SODIUM SALT

$CH_3C{:}NONaC{:}NONaCH_3.8H_2O$. Mol. Wt., 294.15. The gravimetric and colorimetric determinations of nickel can now be conducted more efficiently and much more economically by the use of the new E & A Dimethyl Glyoxime Sodium Salt, is quickly prepared for use because of its high solubility in water, 20 gms. per 100 ml at 25°C. It also eliminates an objectionable feature of dimethylglyoxime for the gravimetric method in that there is no possibility of error due to an excess of the reagent being weighed with the precipitate (as may be the case with dimethylglyoxime because of its low solubility in water or dilute alcohol.). Eimer and Amend.

sym.-DIMETHYLETHYLENE DIAMINE

$CH_3NHCH_2CH_2NHCH_3$. Mol. Wt., 88. B.P., 118-119°C. Colorless, anhydrous liquid. Chemical properties: Undergoes typical reactions of secondary amines. Difunctional character makes it particularly interesting as an intermediate for organic synthesis. Available only in small quantities for experimental investigation. Rohm & Haas Co.

DIMETHYL HYDANTOIN

$(CH_3)_2CCONHCO$. Mol. Wt., 128.13. M.P., 178°C. at 760 mm. White, crystalline solid. Sol. in water, ethanol, diethyl ether, and ethyl acetate. Slightly soluble in isopropanol, acetone, and methyl ethyl ketone. Insoluble in hydrocarbons and trichlorethylene. Use: As a chemical intermediate through substitutions in the imino and carbonyl groups, fissure of the ring with mineral acids and dilute alkali solutions, reactions with formaldehyde, and chlorination. Available in limited quantities. E. I. du Pont de Nemours & Co., Inc.

DIMETHYLISIPROPANOLAMINE

$CH_3CHOHCH_2N(CH_3)_2$. Mol. Wt., 103.14. Sp. Gr., 0.857 at 20/20°C. B.P., 125° to 126°C. at 760 mm. R.I., 1.4220 at 20°C. Solubility in water and of water in, complete at 20°C. Chemical properties: Combines the properties of a tertiary amine and a secondary alcohol. Uses: As an intermediate in the synthesis of the pharmaceutical amidone; suggested as intermediate for reactions common to dimethylethanolamine and diethylethanolamine. Available in commercial quantities. Carbide and Carbon Chemicals Corp.

DIMETHYL OCTADECYL BENZYLAMMONIUM CHLORIDE

A quarternary ammonium compound which finds use as a cationic emulsifier and as a cationic germicide. The fatty chain is of correct length for optimum germicidal potency. Warwick Chemical Co.

3-5 DINITROBENZOYLCHLORIDE

$C_6H_3\text{-}(NO_2)_2\text{-}COCl$. Mol. Wt. 230.6. Cream colored crystals. M.P., 69-70°. Use: Identification and isolation of certain high molecular compounds containing hydroxy-groups. Fairmount Chemical Co.

2,4-DINITRO-1-NAPHTHOL-7-SULFONIC ACID (Flavianic Acid)

$C_{10}H_6O_8N_2S$. Mol. Wt., 314. M.P., 151°C. Yellow needles. Very soluble in water. Uses: Intermediate, precipitant for organic bases and reagent for amino acids. Available in commercial quantities. Bios Laboratories.

2,4-DINITRO-6-PHENYLPHENOL

$(NO_2)_2(C_6H_5)C_6H_2OH$. Mol. Wt., 260.2. Use: Agricultural insecticide; chemical synthesis. Available in limited commercial quantities. The Dow Chemical Co.

DIPHENYLACETONITRILE

$(C_6H_5)_2CHCN$. Mol. Wt. 193. Colorless crystals M.P., 73-73.5°C, insoluble in water and very soluble in alcohol. Uses: Preparation of diphenylacetic acid, p-diphenyl ethyl amine and synthesis of anti-spasmodics (Ex. Amidon). Winthrop Chemical Co., Inc.

DIPHENYLACETONITRILE

$(C_6H_5)_2CHCN$. Mol. Wt., 193.24. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

DIPROPYLENE GLYCOL, BUTYL ETHER (Dowanol 54B)

$C_4H_9OC_3H_6OC_3H_6OH$. Mol. Wt., 190.3. Sp. Gr. at 25/4°C., 0.914. B.P. at 760 mm. Hg, 228°C.; at 10 mm. Hg, 105°C. Viscosity at 25°C., 5.0 cps. R.I. at 25°C., 1.425. Fire pt., 116°C. Solubility: Completely miscible with heavy mineral oil, VMP naphtha, acetone, ethanol, benzene, carbon tetrachloride, ether, methanol, monochlorobenzene, and petroleum ether. Solubility in water at 25°C., 4.3 gm/100 gm water. The characteristics of this glycol ether favor the solubility of aliphatic hydrocarbons making this compound an exceptional coupling agent for this type of compound. Available in experimental quantities. The Dow Chemical Company.

DIPROPYLENE GLYCOL, ETHYL ETHER (Dowanol 54B)

$C_2H_5OC_3H_6OC_3H_6OH$. Mol. Wt., 162.20. Sp. Gr. at 25/4°C., 0.927. B.P. at 760 mm. Hg, 196.7°C.; at 10 mm. Hg. 81.0°C. Viscosity at 25°C., 3.4 cps. R.I. at 25°C., 1.419. Fire Pt., 90°C. Solubility: Completely miscible with water, VMP naphtha, acetone, ethanol, benzene, carbon tetrachloride, ether, methanol, monochlorobenzene, and petroleum ether. This compound is completely miscible with water below 72°C. However, above 72°C. incomplete miscibility is observed. The reciprocal solubilities of Dowanol 51B and water at 80°C. are 26 gm Dowanol, 100 gm water, and 49 gm water/100 gm Dowanol. Like other glycol ethers the solvent properties of Dowanol 51B make it useful in dyeing and textile printing, leather treating, lacquers, and hydraulic fluids. Available in experimental quantities. The Dow Chemical Co.

DI(PROPYLENE GLYCOL), 4,4'-ISOPROPYLIDENE BISPHENYL ETHER (Dowanol 6B)

$(CH_3)_2C(C_6H_4OC_3H_6OH)_2$. Mol. Wt., 436.5. Boiling Range (5.95%) at 2 mm. Hg, 240-243°C. Viscosity at 60°C., 1100 cps. Solvent properties: Dissolves in all common solvents except aliphatic naphthas, glycerine and water. Generally compatible with organosoluble cellulose derivatives up to a 50:50 ratio and with resins except vinyl resins. Dowanol 6B is an active alcohol solvent and has very low volatility and therefore is finding use in the ink and dye industry. The Dow Chemical Co.

DIPROPYLENE GLYCOL, METHYL ETHER (Dowanol 50B)

$CH_3OC_3H_6OC_3H_6OH$. Mol. Wt., 148.2. Sp. Gr. at 25/4°C., 0.950. B.P. at 760 mm. Hg, 189°C.; at 10 mm. Hg, 74.5°C. Viscosity at 25°C., 3.5 cps. R.I. at 25°C., 1.419. Fire Pt., 85°C. Solubility: Completely miscible with water, VMP naphtha, acetone, ethanol, benzene, carbon tetrachloride, ether, methanol, monochlorobenzene and petroleum ether. The complete water solubility plus high solubility for a large number of organic dyes, pigments, soaps, and oils make Dowanol 50B valuable in many solvent applications. The low rubber-swelling characteristics of this chemical contribute to its effectiveness in hydraulic brake fluids. Available in semi-commercial quantities. The Dow Chemical Co.

DIPROPYLENE GLYCOL, PHENYL ETHER (Dowanol 5B)

$C_6H_5OC_3H_6OC_3H_6OH$. Mol. Wt., 216.3. Sp. Gr. at 25/25°C., 1.105. R.I. at 25°C., 1.535. Boiling Range (5-95%) at 10 mm. Hg, 149.8-163°C. Flash Pt., 315°F. Viscosity at 25°C., 26.3 cps. Chemical properties: is easily esterified to produce a large number of esters with interesting properties. Presence of the phenyl group, three ether linkages and an alcohol group give Dowanol 5B unusual solvent properties which when combined with the low evaporation rate make this chemical of interest to perfumers, ink manufacturers, and in the dye industry. Available in experimental quantities. The Dow Chemical Co.

DISODIUM PHOSPHITE (Anhydrous)

Na_2HPO_3. Mol. Wt., 125.982. M.P., decomposes 130°C. pH 2% solution, 7.0. White crystalline hygroscopic powder. Assay, 63-65% H_3PO_3. Uses: As a mild reducing agent in neutral solution humectant, detergent additive. Availability: Laboratory quantities. Monsanto Chemical Co.

DI-Tertiary-BUTYL PEROXIDE

$(CH_3)_3C\text{-}O\text{-}O\text{-}C(CH_3)_3$. Mol. Wt., 146.22. Sp. Gr., 0.80 at 20°/4°C. R.I., 1.389 at 20°C. B.P., 111°C at 760 mm. Solubility in Water <0.1% weight at 20°C. Flash Pt., Tag open cup, 65°F. Di-tertiary-butyl peroxide is an unusually stable liquid organic peroxide. High purity and ready solubility in most resin monomers make it of particular interest as a polymerization catalyst for reactions carried out above its activation temperature of about 90°C. The stability and high activation temperature of this peroxide permit addition to monomers or partial polymers with little danger of pre-cure or instability on storage at atmospheric temperatures during normal processing. Di-tertiary-butyl peroxide itself is insensitive to shock and can be stored for long periods of time without change in composition. Shell Chemical Corp.

DODECYLPHENOL (Technical)

$C_{12}H_{25}C_6H_4OH$. Mol. Wt., 263.42. A light straw colored liquid. Sp. Gr. at 20°/20°C., 0.93. Boiling range 310-335°C. Flash Pt., above 250°F. Phenolic odor. Uses: Intermediate for preparation of wetting agents and detergents. Lubrication oil additive. Available in semi-commercial quantities. Sharples Chemicals, Inc.

DODECYL TRIMETHYL AMMONIUM CHLORIDE

$C_{12}H_{25}N(CH_3)_3Cl$. Mol. Wt., 263. Surface tension at 25°C., 0.1% in water, 33 dynes/cm. Color, white. Soluble in water and alcohol. Uses: germicides, moldicides, fungicides, textile fiber softeners, cationic emulsifiers, flotation reagents, etc. Available as 33% paste in carload quantities. Also quaternaries of a range of alkyl groups available from water-soluble to oil-soluble. Armour Chemical Division.

DYPNONE (Sun Screen)

$C_{16}H_{14}O$. Mol. Wt., 222.27. Sp. Gr., 1.093 at 20/20°C. R.I., 1.6298 at 20°C. B.P. 246°C. (50 mm.). Vapor pressure, less than 0.01 mm. at 20°C. Viscosity, absolute, 39.7 cps. at 20°C. Solubility in water, less than 0.01% by wt. at 20°C. Solubility of water in, 0.34% by wt. at 20°C. Ultraviolet absorption data indicate that concentrations of 1 to 2 per cent should be highly effective as sun-screens in cosmetics. Patch tests on humans indicate that such concentrations are not irritating. Available in research quantities. Carbide and Carbon Chemicals Corp.

EMERY'S M461R DILINOLEIC ACID

$C_{36}H_{66}(COOH)_2$. Mol. Wt., 560 (approx.). Sp. Gr., 0.921 at 100°C. R.I., 1.4851 at 40°C. Iodine value, 80. N.E., 304. Appearance, heavy viscous liquid. Odor, slight. Color, light yellow. Chemical Properties, forms polyamides with ethylene diamine or other diamino materials, forms polyesters with glycols, alkaline soaps water soluble, has slight drying properties due to residual double bonds. Suggested uses: as dibasic acid in alkyds as modifier, in polyamide resin, as polyester or metallic soap for petroleum additive, as emulsifying agent, in adhesives, as shellac substitute. Available in drum quantities with carload or tank-car quantities anticipated first quarter 1948. Emery Industries, Inc.

ETHYLETHANOLAMINES 161

A mixture of Ethylmonoethanolamine ($C_2H_5NHC_2H_4OH$) and Ethyldiethanolamine [$C_2H_5N(C_2H_4OH)_2$]. Approximate molecular equivalent (combining weight) 110. A light straw liquid. Sp. Gr. at 20°/20°C, 0.95—0.99. Initial B.P. not below 100°C. Final B.P. not above 265°C. Flash pt., 90°F. Average Weight per gallon, 8.1 lb. Use: In the preparation of emulsifying agents. Suggested applications: "Self-polishing" floor waxes, hydrocarbon oil emulsions, emulsion paints, cosmetic preparations. Available in commercial quantities. Sharples Chemicals Inc.

b-ETHOXYPROPIONIC ACID

$CH_3CH_2OCH_2CH_2COOH$. Mol. Wt. 118. B. P., 216°C. (with decomposition) at 760 mm.; 112° to 114° C. at 15 mm. Suggested for use in chemical syntheses, for example, in the preperation of ethers of Vitamin A. Available in research quantities. Carbide and Carbon Chemicals Corp.

N-ETHYL BENZENESULFONAMIDE

$C_6H_5SO_2NHC_2H_5$. Mol. Wt., 185.24. M.P., 57-59°C. B.P., 164-5°C. at 2.8 mm.; 210°-211°C at 21 mm. Solubility in water, slight. Odor, none. Color, white to cream. Chemical properties: Reacts with aqueous alkali metal hydroxide to form the metal salt of the amide. Nitration with concentrated nitric acid can result in nitration of the ring or formation of nitramide. Reacts with alkylating agents in alkaline media to give N, N-disubstituted amide. Reacts with benzenesulfonyl chloride in the presence of caustic to form N-ethyl dibenzenesulfonamide. Reacts with formaldehyde to form resins. Undergoes other reactions common to N-substituted benzenesulfonamide. Uses: In the synthesis of dyes, pharmaceuticals and other organic chemicals. In resin manufacture and as a plasticizer for certain types of synthetic resins. Available in pilot plant quantities for experimental investigations. Wyandotte Chemicals Corp.

2-ETHYLBUTYL BROMIDE

$C_6H_{13}Br$. Mol. Wt., 165.08. Sweet, water-white liquid, insoluble in water. Uses: Preparation of disinfectants, antiseptics, pharmaceuticals. Available in research quantities. Halogen Chemicals, Inc.

ETHYL BUTYL KETONE

$CH_3CH_2CH_2CH_2COCH_2CH_3$. Mol. Wt. 114.18. Sp. Gr., 0.8191 at 20/20°C. Boiling range, 142.8 to 147.8°C. Acidity as acetic, 0.034%. Purity, 95%. Color (A.P.H.A.), 30. Weight per gal., 6.8 lb. Evaporation rate is faster than that of "Cellosolve" acetate, diisobutyl ketone, and methyl amyl ketone; and slower than that of butyl acetate and methyl isobutyl ketone. Uses: In solvent mixtures for air-dried and baked finishes; unusual combination of good solvent power and medium evaporating rate; valuable for "Vinylite" resin solutions for adequate flow-out without unduly long drying time; in organosols based on "Vinylite" resin VYNV; in nitrocellulose lacquers using medium- to high-boiling ketone. Available in commercial quantities. Carbide and Carbon Chemicals Corp.

ETHYL CAFFEATE, C.P.

$(HO)_2C_6H_3CH=CHCOOC_2H_5$. Mol. Wt., 208.21. M.P., 144-147°C. Very insoluble in water and very soluble in alcohol. No odor. Tan crystals. Chemical properties: A stable compound. Uses: Strong antioxidant, particularly adapted to food products. Available in research and commercial quantities. The Edwal Laboratories, Inc.

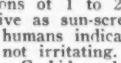
ETHYL b-ETHOXYPROPIONATE

$C_2H_5OCH_2CH_2COOC_2H_5$. Mol. Wt., 146. B.P., 67° C. at 17 mm. Sp. Gr., 0.9490 at 20/4° C. R.I. 20/D, 1.4070. Color, water-white. Used as an intermediate in the synthesis of Vitamin B_1. Available in research quantities. Carbide and Carbon Chemicals Corp.

ETHYLENEIMINE

C_2H_5N. Mol. Wt., 43. B.P., 55-56°C. Colorless liquid with strong amine-like odor and toxic properties. Very reactive compound, useful in the synthesis of amino ethers and substituted diamines. Use. Chemical intermediate. Available in commercial quantities. Bios Laboratories.

ETHYLENE THIOUREA



$HNCH_2CH_2NHC=S$. Mol. Wt., 102. White, crystalline solid. M.P., 198-201°C. Water solubility, 2% at 30°C., 9% at 60°C., 44% at 90°C. soluble in ethylene glycol and pyridine, slightly soluble in the lower acohols, kerosene. Chemical properties: Reacts principally in tautomeric —N=C—SH form, giving metallic salts. May be alkylated on the sulfur atom. Reaction with CH_2O forms methylol derivatives which may be resinified. Uses: Intermediate in organic synthesis. Available in pilot plant quantities. Rohm & Haas Co.

2-ETHYLHEXYL BROMIDE

$C_8H_{17}Br$. Mol. Wt., 193.13. Sweet, water-white liquid, insoluble in water. Uses: Introduction of the 2-Ethylhexyl group in organic synthesis. Preparation of disinfectants, pharmaceuticals. Halogen Chemicals Inc.

2-ETHYLHEXYL CHLORIDE

$CH_3CH(CH_2CH_3)(CH_2)_3CH_2Cl$. Mol. Wt., 148.7. Boiling range, 170° to 173.5°C. Sp. Gr., 0.862 at 25/25°C. R.I., 1.4310 at 20°C. Suggested for use as alkylating agent for introducing the 2-ethylhexyl group into organic chemicals to impart greater oil solubility. Available in research quantities. Carbide and Carbon Chemicals Corp.

DI-2-ETHYLHEXYL TETRAHYDRO-PHTHALATE ("Flexol Plasticizer 8HP)

$C_6H_8(COOC_8H_{17})_2$. Mol. Wt., 394. Sp. Gr., 0.9685 at 20/20° C. B.P., 220°C (5mm.). Vapor pressure, 2.0 mm at 200°C. Absolute viscosity, 42.04 cp. at 20°C. Flash Pt., 350°F. (open cup). Solubility of water in, 0.26% by wt. at 20°C. Insoluble in water at 20°C. A clear, light-colored liquid of moderately low viscosity. Has properties of compatibility, low volatility, and stability desirable for plasticizing certain cellulose derivatives and vinyl chloride resins. With vinyl chloride resins, its low vapor pressure gives excellent durability under processing and use conditions. Available in development quantities Carbide and Carbon Chemicals Corp.

ETHYLIDENE FLUORIDE (Genetron 100)

$CH_3.CHF_2$. Mol. Wt., 66.05. B.P., —24.7°C. M.P., —117°C. Critical temperature, 107.5°C. Latent Heat of Vaporization at B.P. 78 cal/g. Sp. Gr. 1.004 at B.P. Surface Tension 17-18 dynes/cm at —30°C. R.I., 1.255 at 20°C. Flammability limits 3.7-18.0% by volume in air. Solubility in water 0.54% at 0°C, 0.25% at 27.5°C. Chemical Properties: The compaund is very stable toward hydrolysis. It is attacked by chlorine and may conceivably be oxidized to difluoroacetic acid. Dehydrohalogenation yields polymerizable unsaturated materials. Uses: In the formulation of aerosol dispersants, as a low temperature solvent or liquid medium, as refrigerant wherein flammability is not a major factor, as selective solvent. Available in experimental quantities. General Chemical Co.

1-ETHYNYLCYCLOHEXANOL

$C_6H_{10}(OH)C\equiv CH$. Mol. Wt., 124.17. B.P., 77.5°C. at 15 mm. Odor, characteristic. Color, water white. Chemical properties: The very reactive triple bond and adjacent hydroxyl group offer wide possibilities in organic chemical synthesis. Uses: Preparation of perfume bases, fluorides, dyes, medicinals, pharmaceuticals, plastics, plasticizers and general organic synthesis. Available in research and technical grades in limited commercial quantities. Farchan Research Laboratories.

FERROUS LACTATE

$Fe(C_3H_5O_3)_2.3H_2O$. Mol. Wt., 287.96. Greenish white powder with slightly ferrogenous odor. Soluble in 40 parts of cold, 12 parts of boiling water; free soluble in Alkali Citrates forming a green solution; very slightly soluble in Alcohol. Ferrous Lactate oxidizes from prolonged exposure to air and should be stored in well closed containers protected from light. Use: As a source of readily assimilated Ferrous Iron in fortified foods, proprietary medicines and ethical pharmaceuticals. Available in commercial quantities. Chemo Puro Mfg. Corp.

FORMAMIDINE HYDROCHLORIDE

$NH{:}CHNH_2.HCl$. Mol. Wt., 80.5. M.P., 80°C. Prisms (from alcohol). Use: Intermediate. Available in research quantities. Bios Laboratories.

α-d-GALACTURONIC ACID

$C_5H_9O_5COOH$. Mol. Wt., 194. M.P., 156-159°C. dec. Spec. rotation, $(\alpha)_D$=+97.29° in water (initial). Colorless needles. Use: Biochemical research. Available in experimental quantities. Bios Laboratories.

d(+)-GLUCOSAMINE

$C_6H_{13}NO_5$. Mol. Wt., 179. M.P., 110°C. Colorless needles from alcohol. Spec. rotation, $(\alpha)_D$=+44° in water. Use: Biochemical research. Available in commercial quantities. Bios Laboratories.

d(+)-GLUCORONIC ACID

$C_5H_9O_4COOH$. Mol. Wt., 194. M.P., 156°C. Spec. rotation, $(\alpha)_D$=+36° in water. Colorless crystals. Soluble in alcohol. Use: Biochemical research. Available in commercial quantities. Bios Laboratories.

l(+)-GLUTAMINE

$C_5H_{10}O_3N_2$. Mol. Wt., 146. M.P., 184-185°C. Colorless needles. Soluble in water. Uses: Biochemical investigation, culture media, nutritional studies and Penicillin production. Available in commercial quantities. Bios Laboratories.

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GLUTARONITRILE (Trimethylenedicyanide)

$NC(CH_2)_3CN$. Mol. Wt., 94. B.P., 144-146°C. (13 mm.). Colorless to straw-colored liquid. Use: Chemical intermediate. Available in commercial quantities. Bios Laboratories.

GLYCERINE HYDRO-SOYATE (C)

$C_{17}H_{33}COOCH_2CHOHCH_2OH$. Mol. Wt., 356. The glycerine mono ester of partially hydrogenated soyabean fatty acids. Density 0.95-0.96/25°C.; M.P., 42° C.; pH of 10% dispersion 7.3; a soft white lard-like paste. Composition: 55% mono ester; free glycerine 12%; Sap. No. 15.0; free (—OH) 12%; I_2 38%; Acid No. 0.18% KOH. Soluble in alcohols, esters, vegetable oils; hazy solutions in hydrocarbons and chlorinated solvents. Uses: As a secondary emulsifier in the preparation of oil-in-water emulsions; as a chemical agent to inhibit the retrogradation of starch in baked goods and so prolong shelf life. Colgate-Palmolive-Peet Co.

GLYCERINE HYDRO-SOYATE (E)

$C_{17}H_{33}COOCH_2CHOHCH_2OH$. Mol. Wt., 356. The glycerine mono ester of partially hydrogenated soyabean fatty acids. Density 0.95-0.96/25°C.; M.P., 38°C.; pH of 10% dispersion 7.3; a soft white lard-like paste. Composition: 42% mono ester; free glycerine 5%; Sap. No. 15.7%; Free (—OH) 8.7%; I_2, 43.0%; Acid No. 0.07% KOH; soluble in alcohols, esters, vegetable oils; hazy solutions in hydrocarbons and chlorinated solvents. Uses: As a chemical agent to inhibit retrogradation of starch in baked goods and so to prolong shelf life; as a secondary emulsifier in the preparation of oil-in-water emulsions. Colgate-Palmolive-Peet Co.

GLYCERINE SOYATE (C)

$C_{17}H_{31}COOCH_2CHOHCH_2OH$. Mol. Wt., 354. The glycerine mono ester of soyabean fatty acids. Density 0.96/50°C.; M.P., 33°C.; pH of 10% dispersion, 7.3; a soft semi-solid at room temperature. Composition: 55% mono ester; 12% free glycerine; Sap. No. 15.1% KOH; free (—OH) 12%; I_2, 38%; Acid No. 0.3% KOH; soluble in alcohols, esters, vegetable oil; hazy solutions in hydrocarbons and chlorinated solvents. Uses: As a drying oil pigment dispersant for use in paints and inks; as an intermediate in the preparation of glyptal and alkyd resins and lacquers; as an oil-soluble wetting agent in formulations where the drying power is of value. Colgate-Palmolive-Peet Co.

GLYCERINE SOYATE (E)

$C_{17}H_{31}COOCH_2CHOHCH_2OH$. Mol. Wt., 354. The glycerine mono ester of soyabean fatty acids. Density 95/50°C.; M.P., 28°C.; pH of 10% dispersion, 7.3; Composition: 42% mono ester; 5% free glycerine; Sap. No., 15.8% KOH: free (—OH) 8.8%; I_2, 43%; Acid Value, 0.3% KOH; soluble in alcohols, esters, vegetable oil; hazy solutions in hydrocarbons and chlorinated solvents. Uses: As a drying oil pigment dispersant in paints and ink where less than the extreme wetting power of the higher mono ester content of sovate C is required; as an intermediate in the formulation of glyptal and alkyd-type resins and similar surface finishes. Colgate-Palmolive-Peet Co.

2-HEPTADECYLGLYOXALIDINE (Experimental Fungicide 341)

Effective, specific fungicide for control of apple scab, cherry leaf spot, and black spot on roses. Compatible with most commercial insecticides, and requires no sticker, wetting agent, or other special ingredient. Waxy solid. Volatility, less than 0.01 mm. at 20°C. M.P., about 85°C. Slightly soluble in water. Moderately soluble in isopropanol and benzene. Slowly hydrolyzes in water. Available in experimental quantities. Carbide and Carbon Chemicals Corp.

HEPTANEDIOL-2,4

$CH_3CHOHCH_2CHOHCH_2CH_2CH_3$. Mol. Wt., 132.20. Sp. Gr., 0.9319 at 20/20°C. B.P., 224.9°C. at 760 mm. Vapor pressure, 0.01 mm. Hg at 20°C. R.I., 1.4414 at 20°C. Viscosity, 265 cp. at 20°C. Flash Pt. (open cup), 235°F. Solubility in water and water in, complete at 20°C. Highest boiling and most viscous of water-miscible diols. Suggested where mildly hygroscopicity and very low volatility are desired, such as water-soluble plasticizers and dispersants for casein, zein, gelatin compositions, glues, cork, and special printing inks. Long carbon chain should confer greater hydrocarbon solubility than lower diols and make it a specially useful coupling agent. Available in experimental quantities. Carbide and Carbon Chemicals Corp.

1-HEPTYNE (Amyl Acetylene)

$nC_5H_{11}C \equiv CH$. Mol. Wt., 96.17. Density, 0.7322 at 20°/4° C. R.I., 1.4088 at 20°. B.P., 99.8C (7.60 mm.). Freezing Pt., —80.9°C. Odor, characteristic. Color, water-white. Chemical properties: The very reactive triple bond offers wide possibilities in organic chemical synthesis. Used in the preparation of Methyl Heptyne Carbonate and other perfume bases. Uses: Preparation of acetylenic acids, alkyl fluorides, plastics, medicinals, pharmaceuticals, plasticizers, wetting agents and general organic synthesis. Available in research and technical grades in limited commercial quantities. Farchan Research Laboratories.

HEXACHLORO CYCLOHEXANE (Eston)

$C_6H_6Cl_6$. Mol. Wt., 290.85. Consists of five known isomers of which the gamma has been found to be the most toxic to insects. Normally commercial grade contains 8 to 12% gamma isomer, but by a special refining process, Eston hexachloro cyclohexane contains 22% gamma isomer. As an insecticide, it has the peculiar characteristic of acting as a stomach poison, contact insecticide and fumigant, making it especially valuable for the control of many hard-to-kill insects. Usually prepared for use as an insecticide dust containing from 0.25% to 2.0% gamma isomer or as an emulsion concentrate containing 0.5% to 1.5% gamma isomer. Soluble in many organic solvents and compatible with the usual non-alkaline dust diluents. Eston's special refining process for increasing the gamma isomer content reduces the typical musty odor to a minimum, premitting its use in many places where the normal commercial grade is not acceptable. Eston Chemicals, Inc.

HEXAETHYL TETRAPHOSPHATE (Eston)

$C_{12}H_{30}O_{13}P_4$. Mol. Wt., 506.44. Sp. Gr., 1.26-1.28 at 25°/4°C.; decomposes at high temperatures; soluble or miscible in H_2O and many organic solvents; not soluble in kerosene; hydrolyzes in low concentrations in water. Uses: Contact insecticide for control of aphids, thrips, spider-mites, soft scale and various other insects. Although toxic to warm blooded animals, decomposes rapidly after application leaving no harmful residue. Effective at very low concentrations in water solutions or in emulsion in the range of 1-500 to 1-5000. When applied as concentrated solution by airplane or fog generators as small an amount as one pound per acre has given effective control of some insect pests. Incorporated into a neutral dust diluent, effective when freshly made at 3% to 5% concentration. Compatible with other non-alkaline insecticides, being a particularly valuable adjunct to DDT. In addition to the straight chemical, formulations ready for use as dilutions in water are available to manufacturers for repackaging; Hexon-90 containing 90% by weight of H.E.T.P. with an effective wetting agent added and Hexon-50 containing 50% by weight of H.E.T.P. in a suitable organic solvent and soluble emulsifier. Eston Chemicals, Inc.

HEXAMETHYLENEDIAMINE (1,6-Diaminohexane)

$H_2NCH_2CH_2CH_2CH_2CH_2CH_2NH_2$. Mol. Wt., 116. M.P., 39-40°C. Colorless leaflets. Soluble in water, ethyl alcohol and ether. Use: Formation of high polymers. Available in commercial quantities. Bios Laboratories.

HEXAMETHYLENEIMINE

$C_6H_{13}N$. Mol. Wt., 99. B.P., 138°C. Oily, straw-colored liquid. Use: Chemical intermediate. Available in experimental quantities. Bios Laboratories.

1-HEXYNE (Butyl Acetylene)

$nC_4H_9C \equiv CH$. Mol. Wt., 82.14. Density, 0.7152 at 20°/4°C. R.I., 1.3990 at 20°C. B.P., 71.4°C. (760 mm.). Freezing Pt., —132°C. Odor, characteristic. Color, water-white. Chemical properties: The very reactive triple bond offers wide possibilities in organic chemical synthesis. Uses: Preparation of perfume bases, acetylenic acids, alkyl fluorides, plastics, medicinals, pharmaceuticals, plasticizers, wetting agents and general organic synthesis. Available in research and technical grades in limited commercial quantities. Farchan Research Laboratories.

2-HYDRINDYLPHENOXYETHANOL

$C_{17}H_{18}O_2$. Mol. Wt., 254.31. Sp. Gr. at 25°/15.6°C—1.030. R.I. at 25°C., 1.5972. Boiling range200-215°C. at 4mm. Product is a pale amber viscous liquid possessing a mild odor. Soluble in alcohols and aromatic hydrocarbons, ketones, esters, etc. Insoluble in water. Compatible with Polyvinyl chloride, Polystyrene, Melamine, Urea-formaldehyde. phenolic zein, Cellulose Acetate, Cellulose Nitrate, polyvinyl chlor-acetate and other plastic raw materials. Uses: As a plasticizer for use with resins, rubbers and plastic raw materials. As a non-volatile solvent for dyes, resins, insecticides, and other organic compounds. Availability: Experimental laboratory quantities of technical grade. The Neville Co.

p-HYDROXYAZOBENZENE-p'-SULFONIC ACID

$HOC_6H_4N{=}C_6H_4SO_3H$. Mol. Wt., 278. Orange red crystals. Very soluble in water. Uses: Analytical reagent, precipitant for numerous organic bases. Available in commercial quantities. Bios Laboratories.

1,8-bis (p-HYDROXYPHENYL)-MENTHANE

$C_{22}H_{28}O_2$. Mol. Wt., 324.4 M.P., 102°C minimum. Slightly soluble in benzene, methanol, ethanol and isopropanol. Soluble in aqueous alkalis. Product is pale amber crystalline material. Chemical Properties: The two hydroxy groups are very reactive, particularly with active hydrogen atoms leading to many condensations. The mono and di alkali salts are also very reactive and undergo characteristic reactions. The phenolic groups can be further alkylated. Physical Properties: Product exhibits polymorphic nature in that the crystalline form, when melted and subsequently cooled, becomes hard and resinous as a supercooled liquid. Uses: Modification of drying, semi-drying and non-drying oleo-resinous oils. Manufacture of dyes, pharmaceuticals, resins, plasticizers. Useful in drug, coatings, plastics and miscellaneous compounding industries. Availability: Drum quantities of technical grade. Experimental laboratory quantities of pure grade. The Neville Co.

o-HYDROXYPHENYLMERCURIC CHLORIDE

HOC_6H_5HgCl. Mol. Wt., 330.18. M.P., 152.5°C. Solubilities, 27 gms./1. hot water, 20 gms./1. alcohol, 8 grms./1. benzene, 4 gms./1. carbon tetrachloride. No odor. White crystals. Chemical properties: A stable chemical compound; very soluble and stable as alkali phenolate salt. Uses: Antiseptic, fungicide, bactericide. Available in research and commercial quantities. The Edwal Laboratories, Inc.

l(—)-HYDROXYPROLINE (Oxyproline)

$C_5H_9O_3N$. Mol. Wt., 131. M.P., 274°C. Colorless crystals. Spec. rotation, $(\alpha)_D$=—81°. Uses: Biochemical investigations, nutritional studies, microbiological tests and culture media. Available in commercial quantities. Bios Laboratories.

IODOL (Tetraiodopyrrol)

C_4HNI_4. Mol. Wt., 570.7. M.P., 140-150°C. dec. Yellow needles from dilute alcohol. Soluble in ether, acetic acid, hot alcohol. Insoluble in water. Use: Antiseptic. Available in commercial quantities. Bios Laboratories.

3-INDOLEPROPIONIC ACID

$C_8H_6N \cdot CH_2CH_2COOH$. Mol. Wt., 189.21. Use: Plant growth control. Available in experimental quantities. The Dow Chemical Co.

dl-ISOLEUCINE

$CH_3CH_2CH(CH_3)CH(NH_2)COOH$. Mol. Wt., 131.17. Use: As a nutritional supplement, and for possible amino acid therapy where indicated. Available in experimental quantities. The Dow Chemical Co.

l(+)-ISOLEUCINE

$CH_3CH_2CH(CH_3)CH(NH_2)COOH$. Mol. Wt., 131. Natural isomer. M.P., 285°C. dec. Spec. rotation, $(\alpha)_D$=+10.7° in water. Colorless crystals. Uses: Biochemical research, nutritional studies, microbiological investigations. Available in limited quantities. Bios Laboratories.

5-ISOPROPYLAMINO-1-PENTANOL

$HOCH_2(CH_2)_3CH_2NHCH(CH_3)_2$. Mol. Wt., 145.2. Appearance, light straw solid. Odor, faint amine. Solidification point, 40-50°C. Boiling Range, 225-234°C. Flash pt., 230°C. Use: Intermediate for the synthesis of pharmaceuticals. Available in semi-pilot plane quantities. Sharples Chemicals, Inc.

ISOPROPYL CARBANILATE

$C_6H_5NHCOOCH(CH_3)_2$. Mol. Wt., 179.21. Use: Herbicide, particularly for killing quack grass. Available in experimental quantities. The Dow Chemical Co.

ISOPROPYL 2,4-DICHLOROPHENOXY-ACETATE

$Cl_2C_6H_3OCH_2COOCH(CH_3)_2$. Mol. Wt., 263. Amber, oily liquid. Plant growth control material. Uses: Formulation of weed killers. Available in commercial quantities. The Dow Chemical Co.

4,4'-ISOPROPYLIDENE-DI-o-CRESOL (Bisphenol C)

$(CH_3)_2C[C_6H_3OH(CH_3)]_2$. Mol. Wt., 256.33. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

BAKER PLASTICIZERS

IMPART

Retained Flexibility

TO

VINYL RESINS — CELLULOSE RESINS

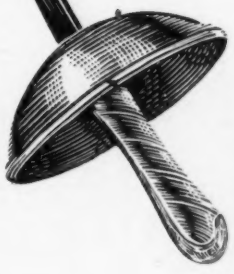
PHENOL FORMALDEHYDE RESINS

MELAMINE RESINS — STYRENE RESINS

UREA FORMALDEHYDE RESINS

AND

GR-S — GR-N — GR-M



THE BAKER CASTOR OIL COMPANY

Established 1857

120 Broadway, New York 5, New York

Chicago, Illinois — Los Angeles, California

o-ISOPROPYLPHENOL

$(CH_3)_2CHC_6H_4OH$. Mol. Wt., 136.19. Use: Chemcial synthesis. Available in experimental quantities. The Dow Chemical Co.

p-ISOPROPYLPHENOL

$(CH_3)_2CHC_6H_4OH$. Mol. Wt., 136.19. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

ISOPROPYL-N-PHENYLCARBAMATE (Technical)

$C_6H_5NHCOOCH(CH_3)_2$. Mol. Wt., 179.21. M.P., 84°C. Very slightly soluble in water. Soluble in alcohol, acetone, isopropyl alcohol. Faint pleasant odor. White to off-white crystals. Chemical properties: A stable chemical compound. Uses: A narrow-leaf herbicide, with stimulatory effect on certain broad-leaf plants. Available in research and commercial quantities. The Edwal Laboratories, Inc.

ITACONIC ACID

$CH_2{=}C(COOH)CH_2COOH$. Mol. Wt., 130.1. White, odorless crystals. 8.3 grams dissolve in 100 cc water at room temperature. Soluble in alcohols and acetone but sparingly soluble in other organic solvents. M.P. 167-8°. Terminal, conjugated unsaturation highly reactive. Undergoes usual reactions of acids. Esters will polymerize or may be used in copolymerizations. Uses: Resins, chemical intermediate. Charles Pfizer & Co., Inc.

LITHIUM ACETATE

$LIC_2H_3O_2.2H_2O$. Mol. Wt., 101.99. White Crystal. Very Soluble in water and/or alcohol. Use: Medicinal. City Chemical Corp.

LITHIUM ALUMINATE

$LiAlO_2$. Mol. Wt. 65.9. White powder. M.P., above 1625°C. It has application as a flux in high refractory porcelain enamels. Metalloy Corp.

LITHIUM ALUMINUM HYDRIDE

$LiAlH_4$. Mol. Wt., 37.94. Light porous white powder. Decomposes to LiH, Al and H_2 above 130° C without melting. Reacts rapidly with water yielding hydroxides and four mols of hydrogen. Solubility in 100 g solvent diethyl ether 30 g: tetrahydrofuran 13 g: dibutyl ether 0.1 g. Insol. or very sp. sol. in hydrocarbons. Reacts with other solvents. Chemical properties: Reduces organic doubly bonded oxygen to hydroxyl, eg. aldehydes, ketones, esters, anhydrides, and chlorides are reduced smoothly in ether solution to alcohols. Nitriles are reduced to amines, aromatic nitro compounds to azo compounds. Carbon to carbon double bonds are generally unaffected. Reactive organic halides are reduced to hydrocarbons (e.g. allyl bromide to propene). Many inorganic halides of the second, third, fourth and fifth groups are reduced to hydrides, e.g. Al, As, B, Ga, Ge, Si, Sn hydrides have thus been prepared. Uses: Reduction of pharmaceutical, perfume, and dyestuff intermediates. Laboratory reductions, hydrogen source, propellant. Available only in small quantities until 1948. Metal Hydrides Inc.

LITHIUM ARSENATE (primary)

LiH_2AsO_4. Mol. Wt., 147.87. White Crystal, soluble in water. City Chemical Corp.

LITHIUM ARSENATE

Li_3AsO_4. Mol. Wt., 159.73. White Crystal. Slightly soluble in water, soluble in dilute acids. City Chemical Corp.

LITHIUM BROMATE

$LiBrO_3$. Mol. Wt., 134.86. White Crystal. Soluble in water. City Chemical Corp.

LITHIUM COBALTITE

$LiCoO_2$. Mol. Wt., 97.9. Dark blue powder. Insoluble in water. Stable compound, exhibiting no oxygen loss when heated in air at 950° to 1000° C. This is in contrast to the behavior of Co_3O_4, which loses oxygen and changes to CoO at about 900°C. The compound exhibits both the fluxing property of Li_2O and the adherence-promoting property of cobalt oxide. Metalloy Corp.

LITHIUM LACTATE

$LiC_3H_5O_3$. Mol. Wt., 95.98. White odorless powder, very soluble in water with practically neutral reaction. Use: wherever a dry alkali lactate is required, lithium lactate being nonhygroscopic and stable, whereas sodium and potassium lactates can be prepared in solution only. Available in commercial quantities. Chemo Puro Mfg. Corp.

LITHIUM LACTATE

$LiC_3H_5O_3$. Mol. Wt., 95.98. White powder. Soluble in water. Use: Medicinal. City Chemical Corp.

LITHIUM MANGANITE

Li_2MnO_3. Mol. Wt., 116.8. Reddish brown powder. Insoluble in water. Extremely stable, undergoing no oxygen loss when heated to 1100° C. for two hours, either in air or an inert atmosphere. This is in contrast to MnO_2, which on heating in air loses some oxygen between 500° and 600° C., and which is transformed to Mn_3O_4 at about 1000° C. Lithium Manganite is used both as a smelter addition in the manufacture of frit, and as a mill addition. As a smelter addition, Li_2MnO_3 is substituted for all the MnO_2 (1% to 2%) in conventional ground coats. This results in a firing temperature 40° to 70° lower than that of the corresponding non-lithium ground coat. Metalloy Corp.

LITHIUM METABORATE DIHYDRATE

$LiBO_2.2H_2O$. Mol. Wt., 85.76. White crystalline powder. Soluble in water. Melting point 840° C. (anhydrous). Small percentages on certain types of acid-proof enamels have indicated that this product increases the resistance to hair-lining under strain. Metalloy Corp.

LITHIUM METASILICATE

Li_2SiO_3. Mol. Wt., 89.9. White powder. M.P., 1201° C. It has been found to exhibit strong fluxing properties in highly refractory enamel compositions. The stability and fluxing properties of this lithium compound prompt its use in place of lithium carbonate in vitreous and semi-vitreous glazes. Metalloy Corp.

LITHIUM MOLYBDATE

Li_2MoO_4. Mol. Wt. 173.83. White Crystal, soluble in water. Use: Catalyst in Petroleum Cracking. City Chemical Corp.

LITHIUM MOLYBDATE

Li_2MoO_4. Mol. Wt. 173.8. M.P., 705° C. A white crystalline compound soluble in water. Small amount, added as a mill addition, has given the necessary adherence for applying a white cover coat directly to steel. Metalloy Corp.

LITHIUM TITANATE

Li_2TiO_3. Mol. Wt., 109.8. White powder. Insoluble in water. Exhibits strong fluxing properties when used in small percentages in Titanium-bearing enamels. The insolubility permits its use as a mill addition in vitreous and semi-vitreous glazes. Metalloy Corp.

LITHIUM TUNGSTATE

Li_2WO_4. Mol. Wt., 261.70. White crystal. Soluble in water. City Chemical Corp.

LITHIUM ZIRCONATE

Li_2ZrO_3. Mol. Wt., 153.1. White powder. Insoluble in water. It has been found to be a very efficient flux in glasses containing ZrO_2. It is recommended as a flux in Zirconium-opacified enamels, glazes and porcelains. Metalloy Corp.

LITHIUM ZIRCONIUM SILICATE

$2Li_2O{\cdot}ZrO_2{\cdot}SiO_2$. Mol. Wt., 243. White powder. A strong flux in enamels, glazes and porcelains. It can be used in place of Lithium Zirconate. Metalloy Corp.

LYCOPODIUM ARTIFICIAL

A yellow powder closely resembling the natural crude drug in appearance, bulk and other characteristics. Use: As a form powder in metallurgy, in pyrotechnics and other explosives where its low cost makes it a permanent substitute for the high-priced natural product. Available in tonnage quantities. Chemo Puro Mfg. Corp.

dl-LYSINE MONOHYDROCHLORIDE

$HCl.NH_2CH_2(CH_2)_3CH(NH_2)COOH$. Mol. Wt., 182.65. Use: As a nutritional supplement, and for possible amino acid therapy where indicated. Available in experimental quantities. The Dow Chemical Co.

MAGNESIUM BROMATE

$Mg(BrO_3)_2.6H_2O$. Mol. Wt., 388.25. Sp. Gr., 2.29. M.P., 200° for hexahydrate, also loses all water at 200°. Decomposes at higher temperature. White Crystal or Powder soluble in water. City Chemical Corp.

MERCURIC FLUORIDE

$HgF_2.2H_2O$. Mol. Wt., 274.64. White Crystal. Readily hydrolyzed by water. Soluble Hydrofluoric Acid, available in experimental quantities only. City Chemical Corp.

MERCUROUS OXIDE

Hg_2O. Mol. Wt., 417.22. Sp. Gr., 9.8. Greyish black powder. Insoluble in water, soluble in Nitric Acid. Decomposed by heat and light at 100° into HgO and Hg. Hydrochloric Acid converts it into Hg_2Cl_2. City Chemical Corp.

β(−) METHIONINE

$CH_3SCH_2CH_2CH(NH_2)COOH$. Mol. Wt., 149. Natural isomer. M. P., 283°C. dec. Colorless crystals. Spec. rotation, (α)25/D=−6.87° in water. Uses: Microbiological tests, biochemical research, nutritional investigations, culture media. Available in limited quantities. Bios Laboratories.

METHOXY POLYETHYLENE GLYCOLS 350, 550 and 750

$CH_3OCH_2(CH_2OCH_2)_xCH_2OH$. Mol. Wt., (range), 350 (330-370), 550 (525-575), 750 (715-785). Physical appearance: 350 (slightly viscous liquid), 550 and 750 (soft, wax-like solids). M.P., 350 (−5 to 10°C.), 550 (15 to 25°C.). 750 (27 to 32°C.). Flash Pt. (open cup), 350 (440°F.), 550 (460°F.), 750 (475°F.). All are completely water soluble. Chemical properties: The inert methoxy radical as one terminal group allows the preparation of essentially pure mono fatty acid esters. Uses: To form fatty acid esters useful as detergents, emulsifying and dispersing agents that are not affected by mild acids or hard water. As plasticizers for casein, gelatin compositions, glues, and similar materials. Available in commercial quantities. Carbide and Carbon Chemicals Corp.

METHYLAL

$CH_2(OCH_3)_2$. Mol. Wt., 76.09. Sp. Gr., 20°/4°C, 0.860. R.I. 20/4°C, 1.353. B.P., 42.3°C. Solubility in H_2O at 20°C, 33 gms/100cc. Odor, alcoholic. Color, water white. Flash Pt. °F (open cup) 0°. Chemical properties: Methylal combines with bromine to form the active methylating agent, dibromo methylal. It gives excellent surface water resistance to polyvinyl alcohol or cellulosics. Slowly hydrolyzes in presence of mineral acids to form formaldehyde and methanol. Possesses relatively high water solubility, is easily salted out of solution and shows high stability towards alkalis. Uses: Superior to ether in many respects as a solvent for organic acids and other organic compounds and also excellent acetylene solvent. Effective solvent for cellulosics, synthetic resins and certain ionic compounds. Used as vaporizing solvent for many types of coating processes, and also as reaction solvent. Source of formaldehyde under certain reaction conditions. Celanese Corp.

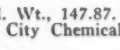
α-METHYLBIBENZYL

$C_6H_5CH(CH_3)CH_2C_6H_5$. Mol. Wt., 196. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

METHYL DICHLOROACETATE

$Cl_2CHCOOCH_3$. Mol. Wt., 142.966. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

2-METHYL FURAN (SYLVAN)



Mol. Wt., 82.098. B.P., 62-64°C. at 760 mm. F.P., −88°C. Sp. Gr., 0.915 at 20°/4°C. R.I., N20/D, 1.434. Flash Pt., −30°C. Colorless, mobile liquid with ether-like odor. Insol. in water. Misc. with most common organic solvents. Cyclic diene with ether-like properties. Uses: Solvent; chemical intermediate, undergoes oxidation; reduction; hydrolysis, acetalization; conversion to other heterocyclic compounds with ammonia, aryl amines, and hydrogen sulfide; Diels-Adler synthesis; reaction with alpha, beta unsaturated aldehydes and ketones; the Mannich reaction; and polymerization. Available in limited quantities. E. I. du Pont de Nemours & Co., Inc.

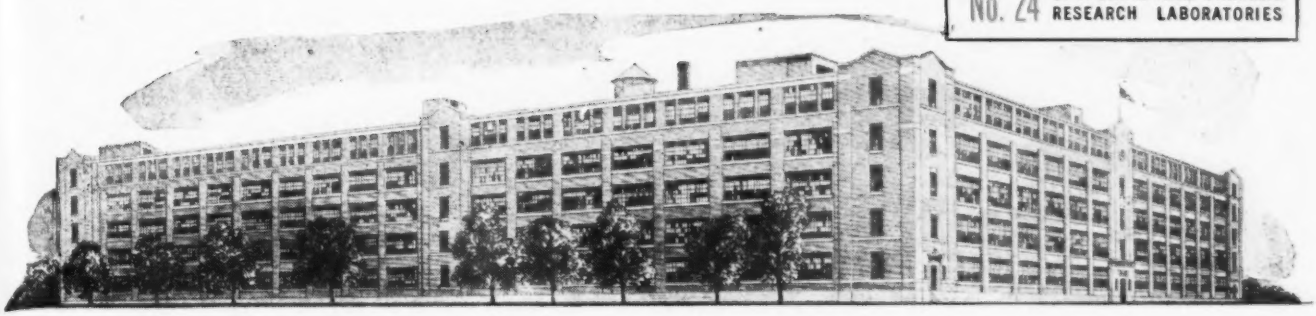
2. METHYL 1,3-PENTANEDIOL

$CH_2(OH)CH(CH_3)CH(OH)CH_2CH_3$. Mol. Wt., 118.17. Sp. Gr., 20°/4°C., 0.9757. R.I., N—23°/4, 1.4483. B.P., 212-214°C. Odor, slight. Color, water-white. Chemical Properties: Shows normal properties of a compound containing one primary and one secondary hydroxy group. The primary hydroxy group can be easily esterified and the secondary group is somewhat less reactive. Under high temperature conditions, methyl pentanediol slowly dehydrates to form 2, methyl pentene-2-ol-1. Uses: Solvent, coupling agent for printing inks, textile manufacture, emulsions, special greases and lubricating oils, cutting oils, cleaning agents and component of hydraulic fluids. Celanese Corp.

METHYLPHLOROGLUCINOL (Technical)

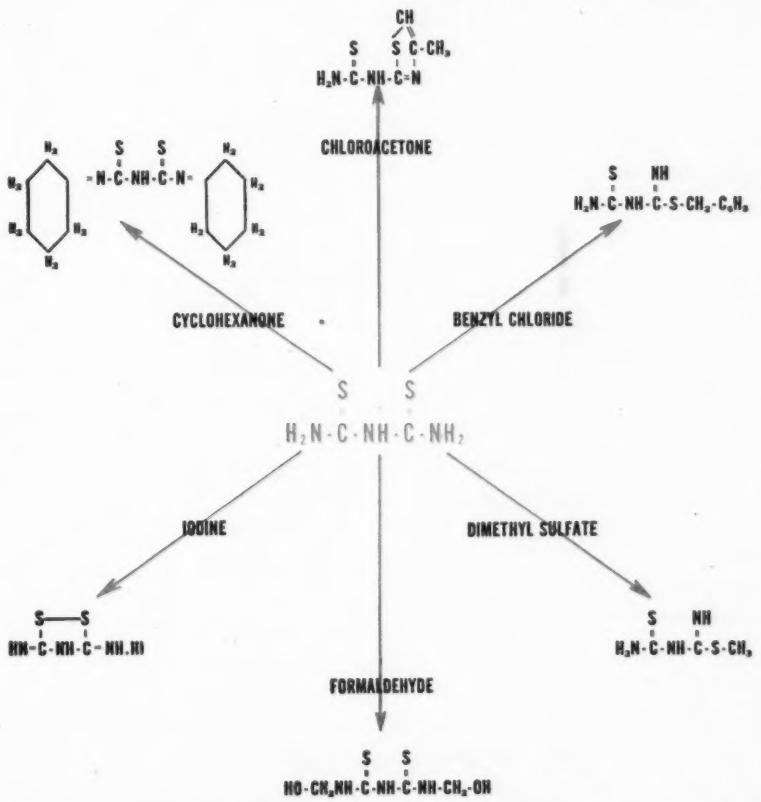
$(HO)_2C_6H_2CH_3$. Mol. Wt., 140.13. M.P., 215°C. Solubility in water, 9 parts per 100 at 25°C., 100 parts per 100 at 100°C. Soluble in

No. 24 OF A SERIES FROM CYANAMID RESEARCH LABORATORIES



Aero* Dithiobiuret $H_2N\text{-}\overset{S}{\overset{\|}{C}}\text{-}NH\text{-}\overset{S}{\overset{\|}{C}}\text{-}NH_2$

a versatile sulfur-nitrogen intermediate



AERO DITHIOBIURET

Molecular weight	135
White needle-like crystals	
Melting point	193-5°C
Solubility	

Acetone—very soluble
Alcohol—soluble
Dioxane—sl. soluble
Pyridine—sl. soluble
Water—v. sl. soluble

Available in research quantities.

Related Organic Nitrogen Compounds

Guanidine carbonate
Guanidine hydrochloride
Phenyl guanidine carbonate**
Phenyl guanidine stearate**
Dicyandiamide
Guanylurea sulfate**

***Available in research quantities*
**Trade-mark*

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COMPANY
Industrial Chemicals Division

Headquarters For Nitrogen Chemicals

SAMPLE AND TECHNICAL DATA

American Cyanamid Company
Section ON, Synthetic Organic Chemicals Dept.
30 Rockefeller Plaza, New York 20, N. Y.

Gentlemen:

☐ *Send me sample of Aero Dithiobiuret* ☐ *Send technical data sheet*

*Name*_____

*Position*_____

*Company*_____

*Address*_____

alcohol and ether, insoluble in benzene. No odor. White to tan crystals. Chemical properties: A stable chemical compound. Uses: A possible pharmaceutical intermediate; dye-coupling component; dyes, plastics, plasticizers and adhesives; perfume intermediate; possible antioxidant for fats and oils. Available in research and commercial quantities to order. The Edwal Laboratories, Inc.

6-METHYLTHIOURACIL

$CH_3C{:}CHCONHC{:}S$. Mol. Wt., 142. M.P., over 300°C. Colorless leaflets, (from water). Slightly soluble in alcohol and ether. Use: Medicinal research. Available in commercial quantities. Bios Laboratories.

MIM ACID PHOSPHATE

Mixture composed mainly of mono and di acid phosphates of methyl isobutyl carbinol. Sp. Gr., 1.05 at 25°C. Acidity, 300 mg KOH per gram. Light brown syrupy liquid. Availability: Pilot plant production. Monsanto Chemical Co.

MONOETHYLENE GLYCOL MONOSTEARATE (G2161)

Soft white, semi-solid. M.P., 25-30°C. Starch viscosity stabilizer for use in such industries as paper, textile and laundry. Atlas Powder Co.

MONOSODIUM PHOSPHITE (ANHYDROUS)

NaH_2PO_3. Mol. Wt., 103.993. M.P., decomposes 250°C. pH 2% solution, 3.9. White crystalline hygroscopic powder. Assay, 76-78% H_3PO_3. Uses: As a mild reducing agent, humectant, detergent additive. Availability: Laboratory quantities. Monsanto Chemical Co.

2-NAPHTHOXYACETIC ACID

$C_{10}H_9OCH_2COOH$. Mol. Wt., 202.2. Use: Plant growth control. Available in limited commercial quantities. The Dow Chemical Co.

α-NAPHTHYLETHYLENEDIAMINE DIHYDROCHLORIDE

$C_{10}H_7NHCH_2CH_2NH_2.2HCl$. Mol. Wt., 259.2. Colorless crystals. Soluble in water. Use: Reagent for the quantitative determination of Sulfa drugs. Available in commercial quantities. Bios Laboratories.

NICKEL FLUOBORATE SOLUTION

$Ni(BF_4)_2$ Solution. Analysis 43±1% $Ni(BF_4)_2$, free boric acid 2-4%, free fluoboric effuiv. to pH2. Sp. Gr. approx. 1.56. The concentrate easily diluted to proper strength, and with suitable plating assistants added, produces an electroplating bath which may be used at high current density with quantitative current efficiency. It is of especial advantage in plating where ductile deposits are required. Available in limited commercial quantities. General Chemical Co.

NICKEL IODIDE (anhydrous)

NiI_2. Mol. Wt., 312.53. Sp. Gr., 5.834. Black hygroscopic powder. Soluble in water, giving a green solution. Soluble in alcohol. City Chemical Corp.

1-NITRONAPHTHALENE-5-SULFONIC ACID

$C_{10}H_7O_6NS$. Mol. Wt., 253. Greyish crystals. Very soluble in water. Use: Reagent for the precipitation of organic bases. Available in commercial quantities. Bios Laboratories.

l (+)-NORLEUCINE

$CH_3CH_2CH_2CH_2CH(NH_2)COOH$. Mol. Wt., 131. Natural isomer. Colorless leaflets from water. M.P., 285°C. Spec. rotation, $(\alpha)_D$= +4.49° in water. Uses: Amino acid and protein investigations, microbiological tests, nutritional studies. Available in experimental quantities. Bios Laboratories.

n-OCTYL IODIDE

$C_8H_{17}I$. Mol. Wt., 240.17. Colorless liquid. Insoluble in water. Uses: Introduction of the n-Octyl group in organic synthesis. Preparation of antiseptics and disinfectants. Available in experimental quantities. Halogen Chemicals Inc.

1-OCTYNE (Hexyl Acetylene)

$nC_6H_{13}C \equiv CH$. Mol. Wt., 110.19. Density, 0.7457 at 20°/4° C. R. I., 1.4159 at 20° C. B.P., 126.3°C. at 760 mm. Freezing Pt., —79.5°C. Odor, characteristic. Color, water-white. Chemical properties: The very reactive triple bond offers wide possibilities in organic chemical synthesis. Uses: Preparation of perfume bases, acetylenic acids, alkyl fluorides, plastics, medicinals, pharmaceuticals, plasticizers, wetting agents and general organic synthesis. Available in research and technical grades in limited commercial quantities. Farchan Research Laboratories.

dl-ORNITHINE HYDROCHLORIDE

$H_2NCH_2CH_2CH_2CHNH_2COOH.HCl$. Mol. Wt., 167.6. α,δ-diamino valeric acid HCl, white crystalline powder. M.P., 225°C, soluble in water and slightly soluble in alcohol. Available for nutritional research. Winthrop Chemical Co. Inc.

l(+)-ORNITHINE MONOHYDROCHLORIDE

$H_2NCH_2CH_2CH_2CH(NH_2)COOH.HCl$. Mol. Wt., 168.5. Colorless crystals. Very soluble in water. Uses: Biochemical research, microbiological investigations, culture media. Available in experimental quantities. Bios Laboratories.

PENTAMETHYLENEDIAMINE (Cadaverine)

$H_2NCH_2CH_2CH_2CH_2CH_2NH_2$. Mol. Wt., 102.2. M.P., 9°C. B.P., 178°C. Syrupy colorless liquid. Uses: Preparation of high polymers, intermediate, biological research. Available in commercial quantities. Bios Laboratories.

1,5-PENTANEDIOL (Pentamethylene Glycol)

$C_5H_{12}O_2$. Mol. Wt., 104.15. B.P., 239°C. at 760 mm. M.P., −21 to −23°C. Sp. Gr. 0.9938 at 20°/4°C. R.I., N20/D, 1.4499. Flash Pt., 125°C. Colorless, viscous, odorless liquid. Misc. in all proportions with water, methanol, ethanol, acetone, and ethyl acetate. Sol. in diethyl ether at 25°C., ca. 11% by weight. Insoluble in benzene, trichlorethylene, methylene chloride, petroleum ether, and heptane. Uses: As a chemical intermediate in the preparation of esters and polyesters which may be useful as plasticizers, emulsifying agents, and resin intermediates. Other possible applications: In brake fluid compositions, steam-set inks, dyes, paints, paper, leather treating and finishing compositions, and as a plasticizer in certain adhesives and cellulose products. Available in limited quantities. E. I. du Pont de Nemours & Co., Inc.

PENTANEDIOL-2,4

$CH_3CHOHCH_2CHOHCH_3$. Mol. Wt., 100.15. B.P., 199°C. at 760 mm. M.P., 45°C. Solubility in water, 87.9% by wt. at 20°C. A definite crystalline material having two asymmetric carbon atoms which make possible the existence of several stereoisomers. Suggested as a pasticizer and dispersant for casein, zein, gelatin compositions, glues, cork, and special printing inks. Available in experimental quantities. Carbide and Carbon Chemicals Corp.

1-PENTYNE (Propyl Acetylene)

$nC_3H_7C \equiv CH$. Mol. Wt., 68.11. Density, 0.6902 at 20°/4°C. R.I., 1.3852 at 20°C. B.P., 40.2°C. (760 mm.) Freezing Pt., —106°C. Odor, characteristic. Color, water-white. Chemical properties: The very reactive triple bond offers wide possibilities in organic chemical synthesis. Uses: Preparation of perfume bases, acetylenic acids, alkyl fluorides, plastics, medicinals, pharmaceuticals, plasticizers, wetting agents and general organic synthesis. Available in research and technical grades in limited commercial quantities. Farchan Research Laboratories.

PERACETIC ACID

A solution containing (40%) peracetic acid corresponding to 8.6% active oxygen. Sp. Gr. 1.15 at 20°/20°C. Water Miscible. Solubility in organic media similar to acetic acid. pH of 1% solution: Approximately 2.4. Color, water-white. Odor, sharp. Uses: Bleaching agent especially for textiles, proteins, and alkali sensitive materials. Effective in acid and neutral, as well as in alkaline solutions. Catalyst for bulk and emulsion polymerization. Bactericide. Enzyme inactivator. Oxidant in organic synthesis: Hydroxylation and epoxidation of olefinic double bonds; preparation of sulfones; ring splitting action on substituted benzene and naphthalene compounds (i.e. oxidation of phenol to muconic acid, of beta-naphthol to o-carboxycinnamic acid). Available in limited quantities. Buffalo Electro-Chemical Co., Inc.

PHENACETURIC ACID

$C_6H_5CH_2CONHCH_2COOH$. Mol. Wt., 193.1. A fine crystalline powder. M.P., 142-150°C. Neutralization equivalent 192-196. Uses: As a possible additive in antibiotic fermentations. Available in experimental quantities. General Chemical Co.

PHENETHYL BUTYRATE

$CH_3CH_2CH_2COOCH_2CH_2C_6H_5$. Mol. Wt., 192.25. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

PHENYLACETYLENE

$C_6H_5C \equiv CH$. Mol. Wt., 102.13. Sp. Gr., 0.930 at 20°/4°C. R.I., 1.5461 at 20°C. B.P., 142-3°C. M.P., —43°C. Odor, characteristic. Color, water-white. Chemical properties: The very reactive triple bond coupled with the benzene ring offer wide possibilities in organic chemical synthesis. Uses: Preparation of fluorides, acetylenic acids, plastics, medicinals, perfume bases, pharmaceuticals, dyes and general organic synthesis. Available in experimental quantities. Farchan Research Laboratories.

l(−)-PHENYLALANINE

$C_6H_5CH_2CH(NH_2)COOH$. Mol. Wt., 165.2. Natural isomer. Colorless leaflets. M.P., 283°C. dec. Soluble in 33 parts of water at 25°C. Spec. rotation, $(\alpha)_D$=−35.3°. Uses: Biochemical investigations, nutritional studies, microbiological tests. Available in commercial quantities. Bios Laboratories.

PHENYLMERCURIC ACETYLACETONATE

$C_6H_5HgOCH(CH_3)CH_2COCH_3$. Mol. Wt., 378.83. M.P., 210°C. Sparingly soluble in cold water. No odor. White fine crystals. Uses: Fungicide, probably in electrical equipment; antifouling agent; bactericide. Available in research and commercial quantities to order. The Edwal Laboratories, Inc.

PHENYLMERCURIC SACCHARINATE

$C_6H_5HgN(CO)SO_2C_6H_4$. Mol. Wt., 461.90. M.P., 212-214°C. Insoluble in water. No odor. White crystals. Chemical properties: No volatile mercury, mercurous or mercuric ions. Very stable. Uses: Fungicide, particularly in electrical condensers, etc.; anti-fouling agent; bactericide. Available in research and commercial quantities. The Edwal Laboratories, Inc.

PHLOROGLUCID

$(HO)_3C_6H_2.C_6H_3(OH)_2$. Mol. Wt., 234.20. M.P., 274°C. Solubility in water, slightly soluble hot. No odor. White to yellow fine crystals. Chemical properties: A stable chemical compound, having most of the chemical reactivities of phloroglucinol. Uses: An intermediate in synthesis of corresponding ethers; a modified coupling component in diazotype dyes. Available in research and commercial quantities to order. The Edwal Laboratories, Inc.

PHLOROGLUCINOL CARBOXYLIC ACID

$(HO)_3C_6H_2COOH$. Mol. Wt., 170.12. M.P., decomposed at 75-80°C. to give phloroglucinol. Solubility in water, very slightly soluble. No odor. White crystals. Chemical properties: A stable chemical compound at room temperature, decomposing either in solid state or solution with liberation of CO_2. Uses: In process requiring a controlled liberation of inert gas (such as in manufacture of sponge rubbers); an intermediate in synthesis of corresponding esters and ethers. Available in research and commercial quantities to order. The Edwal Laboratories, Inc.

POLYETHYLENE GLYCOL (Polyglycol E-400)

$HOC_2H_4(OC_2H_4)xOC_2H_4OH$. Av. Mol. Wt., 400. A pale straw-colored viscous liquid with a faint, pleasant odor. Sp. Gr. at 25/25°C., 1.124; at 60/60°F., 1.127. Pour Pt., —11°C. R.I. at 25°C., 1.462. Viscosity at 77°F., 76.4cps.; at 140°F., 17.9 cps. Use: Plasticizer and dispersant for coating materials, printing inks and dyes. Intermediate for synthesis of fatty acid esters for plasticizers and detergents. Available in limited commercial quantities. The Dow Chemical Co.

POLYETHYLENE GLYCOL (Polyglycol E-600)

$HOC_2H_4(OC_2H_4)xOC_2H_4OH$. Av. Mol. Wt., 600. An amber-colored viscous liquid. Sp. Gr. at 25/25°C., 1.122; at 60/60°F., 1.125. Pour Pt., 3°C. R.I. at 25°C., 1.464. Viscosity at 77°F., 99.3 cps.; at 140°F., 22.9 cps. Use: Plasticizer and dispersant for coating materials, printing inks, and dyes. Intermediate for synthesis of fatty acid esters for plasticizers and detergents. Available in limited commercial quantities. The Dow Chemical Co.

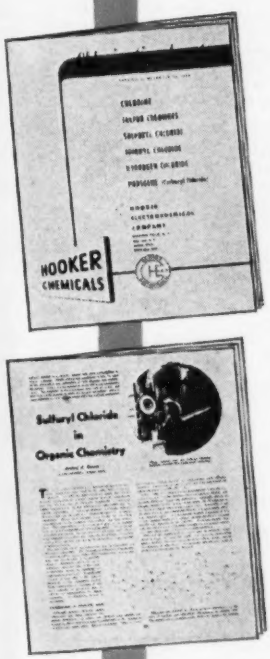
POLYETHYLENE GLYCOL (Polyglycol E-1200)

$HOC_2H_4(OC_2H_4)xOC_2H_4OH$. Av. Mol. Wt., 1200. A white to straw-colored waxy semisolid. Freezing Pt., 29.3°C. Use: Plasticizer and mutual solvent for printing inks, dyes and coating materials. Softener and humectant for leather, paper and textiles. Water soluble lubricant. Available in limited commercial quantities. The Dow Chemical Co.

5 Types of Reactions

you can carry out with Sulfuryl Chloride

1. **Chlorination of aromatic compounds**
2. **Chlorination of aliphatic compounds**
3. **Sulfonation of aliphatic compounds**
4. **Sulfonation of aromatic compounds**
5. **Acylation** (preparation of esters, acid chlorides, anhydrides, etc.)



Chlorination

Sulfuryl Chloride offers certain advantages as a chlorinating agent that are quite universally recognized. They are principally:

1. The heat of chlorination is far less than that using elementary chlorine.
2. It is possible by using different catalysts, reacting at different temperatures and by carefully controlling proportions of reactants, to chlorinate selectively.

Sulfonation

The availability of sulfur in the compound makes it equally valuable in the sulfonation of aromatics and aliphatics. Sulfonyl chloride derivatives may be obtained by the addition of small quantities of aluminum chloride to a cooled reaction mixture of sulfuryl chloride and aromatic hydrocarbons.

Formation of alkyl sulfonyl chlorides with yields as high as 70% are reported in the sulfonation of paraffin hydrocarbons in the presence of light and a catalyst.

Acylation

Alkyl chlorsulfonates are the products of reactions of sulfuryl chloride with many alipathic alcohols. A number of interesting acylated products may be produced through the reaction of this versatile chemical with aliphatic and aromatic amines.

* * *

You who are interested in the synthesis of organic chemicals will find Sulfuryl Chloride a valuable reagent. With Hooker Sulfuryl Chloride you will be working with a particularly pure product that tends to increase yield and eliminate side reactions.

For more information on Sulfuryl Chloride as a chlorinating agent write on your letterhead for Bulletin 328A. It also includes data on other Hooker chlorinating agents. For information concerning other reactions of Sulfuryl Chloride send for Bulletin 330, a reprint of an article on "Sulfuryl Chloride in Organic Chemistry." Technical Data Sheet 717 contains typical properties and specifications of Hooker Sulfuryl Chloride.

7-358

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POLYETHYLENE GLYCOL (Polyglycol E-4000)

$HOC_2H_4(OC_2H_4)xOC_2H_4OH$. Av. Mol. Wt., 4000. A white to tan waxy solid. Freezing Pt., 51°C. Use: Dispersing agent for dyes, printing inks, paints and shoe polishes. Lubricant for rubber molds, and wire drawing. Binder for ceramics and foundry cores. Available in limited commercial quantities. The Dow Chemical Co.

POLYETHYLENE GLYCOL DILAURATE (400)

Yellow liquid. M.P., 4-14°C. pH 5% aqueous dispersion, 3.5-4.5; dispersible in water; soluble in alcohols and hydrocarbons. Plasticizer for vinyls for low temperature, low volatility and low water extraction characteristics. Glyco Products Co., Inc.

POLYETHYLENE POLYSULFIDE (Good-Rite)

$(-CH_2CH_2S_5-)_n$. The polymer is supplied as an aqueous dispersion of spherical particles, 1-3 microns, containing 40% active agent. It has a high molecular weight, is insoluble in water and in the usual hydrocarbon solvents. The pH of the aqueous dispersion is 7.0-7.5. Sp. Gr of the 40% latex is 1.210-1.215, of solids 1.33-1.38. Adaptation of the polymer for spraying is based on a new process which permits the preparation of non-phytotoxic aqueous dispersions of fine particle size with remarkable stability. When sprayed on plants, it forms a translucent, elastic, web-like film which is strongly adhesive and highly resistant to rainfall. It is affected only slightly by freezing, long storage or high temperatures. Good-rite polyethylene polysulfide is compatible with standard insecticides and fungicides and, because of its adhesiveness, permits reduction of dosages without loss of fungicidal or insecticidal efficiency. B. F. Goodrich Chemical Co.

POLYGLYCOL DISTEARATE

$C_{17}H_{35}COOCH_2CH_2(OCH_2CH_2)xOCH_2CH_2OOCC_{17}H_{35}$. Disterate ester of polyglycol (av. Mol. Wt., 4000). Density 1.04/50°C.; M.P., 43°C; pH of 10% dispersion 72.6; a soft off-white solid; Sap. No. 2.41% KOH; Acid No. 0.64% KOH; Is, 0.7%; soluble in chlorinated solvents, light esters and acetone. Slightly in alcohols, insoluble in glycols, hydrocarbons and vegetable oil. Uses: plasticizer for various resins; as a component of grinding and polishing pastes to promote easy removal in water. Colgate-Palmolive-Peet Co.

POLYPROPYLENE GLYCOL (Polyglycol P-400)

$HOC_3H_6(OC_3H_6)x\ OC_3H_6OH$. Av. Mol. Wt., 400. A pale, straw-colored, viscous liquid with a faint, pleasant odor. Sp. Gr. at 25/25° C., 1.008; at 60/60° F., 1.013. Pour Pt., -34° C. R.I. at 25° C., 1.445. Viscosity at 77° F., 65.6 cps.; at 140° F., 12.2 cps. Use: Plasticizer and dispersant for coating materials, printing inks and dyes. Intermediate for synthesis of fatty acid esters for plasticizers and detergents. Available in limited commercial quantities. The Dow Chemical Co.

POLYPROPYLENE GLYCOL (Polyglycol P-750)

$HOC_3H_6(OC_3H_6)xOC_3H_6OH$. Average Mol. Wt., 750. A colorless, viscous liquid with a faint, pleasant odor. Sp. Gr. at 25/25° C., 1.004; at 60/60° F., 1.012. Pour Pt., -38° C. R.I. at 25° C., 1.447. Viscosity at 77° F., 94.3 cps.; at 140° F., 19.9 cps. Use: Plasticizer and dispersant for coating materials, printing inks and dyes. Intermediate for synthesis of fatty acid esters for plasticizers and detergents. Available in limited commercial quantities. The Dow Chemical Co.

POLYPROPYLENE GLYCOL (Polyglycol P-1200)

$HOC_3H_6(OC_3H_6)xOC_3H_6OH$. Av. Mol. Wt., 1200. A straw-colored viscous liquid with a faint odor. Sp. Gr. at 25/25° C., 1.003; at 60/60° F., 1.011. Pour Pt., -32° C. R.I. at 25° C., 1.448. Viscosity at 77° F., 145.9 cps.; at 140° F., 29.5 cps. Use: Plasticizer and dispersant for coating materials, printing inks and dyes. Intermediate for synthesis of fatty acid esters for plasticizers and detergents. Available in limited commercial quantities. The Dow Chemical Co.

POTASSIUM ALUMINUM FLUORIDE

K_3AlF_6. Mol. Wt., 258.3. Typical analysis: Al — 10.39%, K — 45.5%, F — 44.3%. This compound is of interest in connection with the manufacture of synthetic mica as described in reports of the German chemical industry. Available in experimental quantities. General Chemical Co.

POTASSIUM PENICILLIN "G" (Crystalline)

A highly purified salt of the antibiotic formed during the growth of certain strains of the genus, "Penicillia", containing over 90% of the penicillin present in the form of the crystalline potassium salt of Penicillin "G". Can be stored 36 months at room temperature without excessive loss in potency in the absence of moisture. Carefully tested to insure sterility, non-toxicity, and freedom from pyrogenic substances. Potency averages 1575 units per milligram. Very soluble in distilled water. pH range, 5-7.5 in solutions of 5,000-10,000 units per milliliter. Rapidly inactivated by certain enzymes, strong acids and bases. Available in bulk or vials containing 100,000, 200,000 and 500,000 units. Uses: pharmaceutical and veterinary medicament. Charles Pfizer & Co., Inc.

POTASSIUM THIOSULFATE

$K_2S_2O_3$. Mol. Wt., 190.31. White Hygroscopic crystal. Soluble in water, insoluble in Alcohol. Use: Analytical. City Chemical Corp.

POTASSIUM ZIRCONIUM FLUORIDE

K_2ZrF_6. Mol. Wt., 283.41. A white crystalline solid. Sp. Gr., 3.48 at 20°C. Solubility in water 0.781g/100 cc water at 2°C, 25 g/100 cc at 100°C. Insoluble in organic solvents. M.P., 750-775°C. Decomposition on heating to 1000-1100°C for 2 hrs. is approximately 4%. Insoluble ZrO_2 is produced. Typical Analysis: K — 27.65%, Zr — 32.13%, F — 40.14%, SiO_2 — 0.06%. Uses: Electrolytic production of metals and alloys, light melting castings. Available in experimental quantities. General Chemical Co.

1 (—) — PROLINE

$C_5H_9O_2N$. Mol. Wt., 115.1. Colorless needles. M.P., 220°C. Very soluble in water. Spec. rotation, $(\alpha)D$=-80.9°. Uses: Biochemical and nutritional studies, microbiological tests, culture media. Available in commercial quantities. Bios Laboratories.

PROPARGYL ALCOHOL

$HC\equiv CCH_2OH$. Mol. Wt., 56.06. Density, 0.9478 at 20°/4° C. R.I., 1.4320 at 20° C. B.P., 113.6° C. (760 mm.). Freezing Pt., -51.8° C. Odor, characteristic. Color, water white. Soluble in water and organic solvents. Chemical properties: The very reactive triple bond and allylic hydroxyl group offer unusually wide possibilities in organic chemical synthesis. Uses: preparation of plastics, medicinals, pharmaceuticals, perfume bases, acetylenic esters and general organic synthesis. Available in limited quantities. Farchan Research Laboratories.

PROPIOLIC ACID

$HC\equiv CCOOH$. Mol. Wt., 70.05. Sp. Gr., 1.139 at 15°/15°C. B.P. 102°C. at 200 mm. Odor, sharp. Color, water-white. Chemical properties: The very reactive triple bond and adjacent carboxyl group offer many varied and interesting possibilities in organic synthesis. Uses: preparation of acetylenic esters, resins, pharmaceuticals, plastics, medicinals and general organic synthesis. Available in experimental quantities. Farchan Research Laboratories.

PROPYLENE GLYCOL, 4-BIPHENYLYL ETHER (Dowanol 48B)

$(C_6H_5)C_6H_4OCH_2CHOHCH_3$. Mol. Wt., 228.28. Use: Synthesis of esters. Available in experimental quantities. The Dow Chemical Co.

PROPYLENE GLYCOL, BUTYL ETHER (Dowanol 37B)

$C_4H_9OCH_2CHOHCH_3$. Mol. Wt., 132.2. Sp. Gr. at 25/4°C., 0.875. B.P. at 760 mm. Hg, 169.8°C, at 10 mm. Hg, 59.5°C. Viscosity at 25°C., 219 cps. R.I. at 25°C., 1.415. Fire Pt., 74°C. Solubility, completely miscible with heavy mineral oil, VMP naphtha, acetone, ethanol, benzene, carbon tetrachloride, ether, methanol, monochlorobenzene and petroleum ether; solubility in water 6.04 g./100g. water at 25°C. The butyl group on this compound increases the solubility for aliphatic hydrocarbons. Dowanol 37B should prove valuable to the paint and lacquer industry as a solvent and plasticizer for resins and a pigment disperser. Hydraulic fluids containing Dowanol 37B have been prepared. Available in experimental quantities. The Dow Chemical Co.

PROPYLENE GLYCOL, p-tert-BUTYLPHENYL ETHER (Dowanol 45B)

$(CH_3)_3CC_6H_5OCH_2CHOHCH_3$. Mol. Wt., 208.29. Use: Synthesis of esters. Available in experimental quantities. The Dow Chemical Co.

PROPYLENE GLYCOL, o-CHLOROPHENYL ETHER (Dowanol 41B)

$ClC_6H_4OCHOHCH_3$. Mol. Wt., 210.26. Use: Nonvolatile, viscous solvent and intermediate for manufacture of esters for plasticizers and solvents. Available in experimental quantities. The Dow Chemical Co.

PROPYLENE GLYCOL, p-CHLOROPHENYL ETHER (Dowanol 78B)

$ClC_6H_4OCH_2CHOHCH_3$. Mol. Wt., 186.64. Use: Nonvolatile viscous solvent for printing inks, etc.; intermediate for synthesis of esters. Available in experimental quantities. The Dow Chemical Co.

PROPYLENE GLYCOL, p-CYCLOHEXYL-PHENYL ETHER (Dowanol 49B)

$C_6H_{11}C_6H_4OCH_2CHOHCH_3$. Mol. Wt., 234.33. Use: Synthesis of esters. Available in experimental quantities. The Dow Chemical Co.

PROPYLENE GLYCOL, 2 4-DICHLORO-PHENYL ETHER (Dowanol 79B)

$Cl_2C_6H_3OCH_2CHOHCH_3$. Mol. Wt., 221.08. Use: Nonvolatile, viscous solvent for printing inks, etc.; intermediate for synthesis of esters. Available in experimental quantities. The Dow Chemical Co.

PROPYLENE GLYCOL, ETHYL ETHER (Dowanol 34B)

$C_2H_5OCH_2CHOHCH_3$. Mol. Wt., 104.2. Sp. Gr. at 25/4°C., 0.983. B.P. at 760 mm. Hg, 131.8°C; at 10 mm. Hg, 30.5°C. Viscosity at 25°C., 1.9 cps. R.I. at 25/4°C., 1.405. Solubility: Completely miscible with water, VMP naphtha, acetone, ethanol, benzene, carbon tetrachloride, ether, methanol, monochlorobenzene and petroleum ether. Dowanol 34B has excellent solubility for organic compounds and is valuable for solubilizing these compounds in water. The surface active properties of this chemical in combination with other solvents indicate its use in textile printing and dyeing industry and in the leather industry. Available in experimental quantities. The Dow Chemical Co.

PROPYLENE GLYCOL, METHYL ETHER (Dowanol 33B)

$CH_3OCH_2CHOHCH_3$. Mol. Wt., 90.1. Sp. Gr. at 25/4°C., 0.916. B.P. at 760 mm. Hg. 119.2°C., at 10 mm. Hg. 21°C. Viscosity at 25°C., 1.7 cps. R.I. at 25°C., 1.401. Fire Pt., 43°C. Solubility: completely miscible with water. VMP naphtha, acetone, ethanol, benzene, carbon tetrachloride, ether, methanol, monochlorobenzene, and petroleum ether. Dowanol 33B is the lowest boiling glycol ether commercially available. The excellent solubility for organic compounds plus complete miscibility with water indicates the usefulness of this chemical in solvent applications. Organic derivatives may be prepared by reactions with the alcohol group. Available in semicommercial quantities. The Dow Chemical Co.

6-n-PROPYLTHIOURACIL

$C_7H_{10}ON_2S$. Mol. Wt., 170. M.P., 216°C. Uses: Medical research and biochemical studies. Available in limited quantities. Bios Laboratories.

PROTEASE (Takamine)

Proteolytic enzyme for the preparation of protein hydrolysates, amino acids and other uses. Stable, uniform, requires no refrigeration. Average Northrup Value, 240 on casein. Average Van Slyke Value, 1% enzyme/casein; 48 hrs; 35% hydrolysis. By formol titration, 1% enzyme/gelatin; 48 hrs; 13% free amino N. Takamine Laboratory, Inc.

PYRIDOXAMINE DIHYDROCHLORIDE

$C_8H_{14}O_2N_2Cl_2$. Mol. Wt., 241. M.P., 226-227°C. dec. Colorless crystals. Uses: Biochemical investigations, culture media. Available in research quantities. Bios Laboratories.

PYRIDOXINE HYDROCHLORIDE

$C_8H_{11}O_3N\cdot HCl$: Mol. Wt., 205.6. Vitamin B_6 isolated as the hydrochloride. White, crystalline odorless powder having a slightly salty taste. MP 204-8°C. with decomposition. Soluble in 5 parts water and slightly soluble in alcohol and acetone. Stable to heat, acids and moderate alkali but decomposed by light. Food and Drug Administration has not yet established minimum daily requirements. Available in 500 gram and smaller bottles. Uses: food, pharmaceutical and animal feed. Charles Pfizer & Co., Inc.

PYRROLE

C_4H_5N. Mol. Wt., 67.09. B.P. 130°-131°C. at 760 mm. Sp. Gr., 0.948 at 20°/4°C. R.I., N20/D, 1.5092. M.P., -23.6°C. Flash pt., 42°C. Colorless liquid, darkens on standing. Characteristic, pleasant odor. Very slightly soluble in water. Miscible in all proportions with trichlorethylene, methylene chloride, benzene, toluene, methanol, ethanol, methyl and

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PYRROLIDINE (Tetrahydropyrrole)

C_4H_9N. Mol. Wt., 71.1. B.P., 88°C. Colorless liquid. Soluble in water, alcohol and ether. Uses: Research chemical and intermediate. Available in limited quantities. Bios Laboratories.

PYRROLINE (Dihydropyrrole)

C_4H_7N. Mol. Wt., 69.1. B.P., 90°C. Colorless liquid. Soluble in water, alcohol and ether. Use: Research chemical. Available in limited quantities. Bios Laboratories.

PYRUVIC ALDEHYDE (Methyl Glyoxal)

CH_3COCHO. Mol. Wt., 72. Supplied commercially as an approximately 30 per cent aqueous solution, which consists of a mixture of various stable hydrated polymers. Color, pale yellow. Practically odorless. Chemical properties: contains two highly reactive carbonyl groups, and undergoes most reactions typical of aldehydes. Uses: of interest in synthesis of pharmaceuticals, dyestuffs, and resin polymers. It is a possible source for pyruvic acid, an important intermediate in synthesis of cincophen (2-phenylquinoline-4-carboxylic acid), used in treating gout, arthritis, and rheumatism. Insolubilizes polyhydroxy compounds such as polyvinyl alcohol and proteins such as casein, gelatin, and animal glues. Available in experimental quantities. Carbide and Carbon Chemicals Corp.

QUINOLINIC ACID (2, 3-Pyridinedicarboxylic Acid)

$C_7H_5O_4N$. Mol. Wt., 167.1. M.P., 190°C. dec. Colorless prisms. Slightly soluble in water, alcohol and ether. Use: Experimental intermediate for drugs, dyes and plastics. Available in limited quantities. Bios Laboratories.

RUTIN (Chromoglucoside)

$C_{27}H_{30}O_{16}$. Mol. Wt.,, 610. M.P., 186-192°C. Yellow needles from water. Soluble in hot alcohol. Insoluble in ether, chloroform and benzene. Use: Clinical investigations. Available in commercial quantities. Bios Laboratories.

SARCOSINE, 50% SOLUTION, SODIUM SALT

CH_3NHCH_2COONa. A synthetic amino acid, heretofore unavailable in commercial quantities, which is very useful in the preparation of synthetic detergents, textile softeners, pharmaceuticals, etc. Warwick Chemical Co.

SEBACAMIDE

$H_2NCO(CH_2)_8CONH_2$. Mol. Wt., 200. M.P., 208°C. Colorless crystals, from dilute Acetic Acid. Insoluble in cold water and cold alcohol. Soluble in hot water and hot alcohol. Use: Intermediate. Available in research quantities. Bios Laboratories.

SEBACONITRILE

$NC(CH_2)_8CN$. Mol. Wt., 164. B.P., 199°C. (15 mm.). Straw-colored oily liquid. Use: Chemical intermediate for drugs, dyes and high polymers. Available in commercial quantities. Bios Laboratories.

SELENIUM DIETHYLDITHIOCARBAMATE

$Se[(C_2H_5)_2N(S)CS]_4$. Mol. Wt., 672. Sp. Gr. at 20°/20°C., 1.39. M.P. approx. 62°C. Appearance, yellow powder. Uses: Vulcanizing agent for continuous cure wire insulation, heat resistant rubber goods and butyl rubber. Available commercially. Sharples Chemicals, Inc.

l(−)-SERINE

$CH_2(OH)CH(NH_2)COOH$. Mol. Wt., 105. Natural isomer. Colorless prisms. M.P. 228°C. Soluble in water. Uses: Biochemical investigations, microbiological tests, culture media, nutritional studies. Available in commercial quantities. Bios Laboratories.

SILVER DIFLUORIDE

AgF_2. Mol. Wt., 145.88. Total Fluorine Content, 26.06%. Available Fluorine, 13.03%. Bulk Density, 1.7 gms/cm³ (approx.) Odor, None, except some HF odor in damp atmosphere. Color, Chocolate brown. Coarse, free-flowing powder. Stable in sealed containers. Reacts quickly with moisture in the atmosphere to form a dark, almost black powder. Reacts with water to form a black, finely divided precipitate Other chemical properties: As a fluorinating agent, yields one atom of fluorine and reverts to the monofluoride. Uses: Fluorinating agent. The spent silver fluoride subsequently may be regenerated with elemental fluorine. Available in limited quantities. Pennsylvania Salt Manufacturing Co.

SODIUM CARBOXYMETHYL CELLULOSE (Du Pont Sodium CMC)

Du Pont Sodium CMC is the sodium salt of carboxymethyl cellulose, otherwise known as sodium cellulose glycolate. It is a water-soluble cellulose ether of unusually versatile properties, offered in several different grades and types. Used in a wide variety of aqueous systems, it serves alternately as emulsifier, protective colloid, thickener, adhesive or protective film. It is insoluble in organic solvents, greases, and fats; at the same time, its films may be treated to yield a considerable degree of water resistance. Viscosity of 2 per cent solution at 25°C. Varies, according to which type is used, from <20 to 10,000 cps.

SODIUM, 2-ETHYLHEXYL SULFOACETATE

$C_8H_{17}OOCCH_2SO_3Na$. Mol. Wt., 274. Light cream colored flakes, highly soluble. Good foaming properties and excellent resistance to hard water. Solutions practically neutral and stable to mineral acids. An excellent solubilizing agent, particularly adapted for soapless shampoo compositions. Also useful as an electroplating assistant by virtue of its ability to lower the surface tension of plating solutions. Available in commercial quantities. National Aniline Division, Allied Chemical & Dye Corp.

SODIUM HEMIPHOSPHITE

$NaH_2PO_2 \cdot H_3PO_3$. Mol. Wt., 185.997. M.P., 156°C. pH 2% solution, 1.9. White crystalline powder, slightly hygroscopic. Assay, 87+% H_3PO_3. Uses. Convenient source of phosphorous acid in solid form. Availability: Laboratory quantities. Monsanto Chemical Co.

SODIUM PENICILLIN "G" (Crystalline)

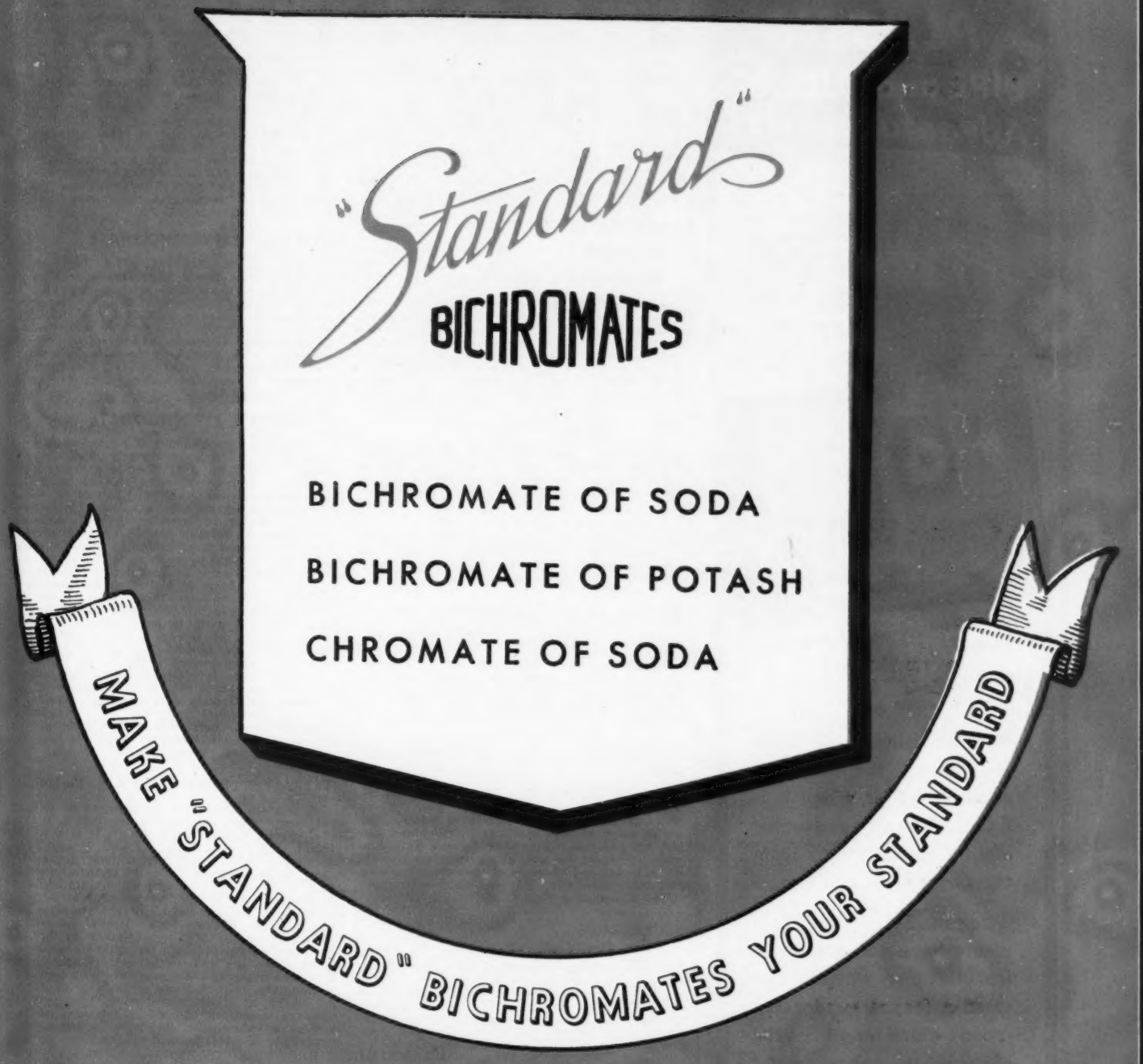
A highly purified salt of the antibiotic formed during the growth of certain strains of the genus "Penicillia", containing over 90% of the Penicillin present in the form of the crystalline sodium salt of Penicillin "G". Can be stored 36 months at room temperature without excessive loss in potency in the absence of moisture. Carefully tested to insure sterility, non-toxicity, and freedom from pyrogenic substances. Potency averages 1640 units per milligram. Very soluble in distilled water. pH range, 5-7.5 in solutions of 5,000-10,000 units per ml. Rapidly inactivated by certain enzymes, strong acids and bases. Available in vials containing 100,000, 200,000, 500,000, 1,000,000, and 5,000,000 units. Uses: Pharmaceutical and veterinary medicament. Charles Pfizer & Co., Inc.

SODIUM TITANIUM FLUORIDE (Sodium Fluotitanate)

Na_2TiF_6. Mol. Wt., 207.90. Total Fluorine Content, 54.8%. Odorless. White, crystalline compound. M.P., Reported to be about 700°C. Slightly more water soluble than the potassium salt; i.e., about 0.5% at 25°C., and 10% at 100°C. Chemical Properties: Heated to between 600 and 800°C., the salt loses TiF_4. Uses: As a flux for melting aluminum, tanning agent for leather; an ingredient of leather dyeing liquors in a mixture with tinctorial woods; as a catalyst; in the manufacture of glass. Available in limited quantities. Pennsylvania Salt Manufacturing Co.

SODIUM XYLENESULFONATE (Naxonate G)

$C_8H_9(CH_3)_2SO_3Na$. Mol. Wt., 208. Naxonate G contains a minimum of 95% Sodium Xylenesulfonate (predominantly the sodium sulfonates of the 1,3 isomer with smaller amounts of the 1,2 isomer). Color, cream. Odor, pleasant. Solubility, 80 gms. per 100 gms. water at 30°C. pH 1% solution, 6.4. Uses: For preparation of hydrotropic solutions. At concentrations up to 40%, these solutions have the property of "salting in" or increasing the solubility in aqueous systems of a variety of organic compounds as thioglycolic acid, benzaldehyde, furfural, o-anisidine, mixed cresols and other phenolic disinfectants, ethyl acetate, nitroparaffins, aniline, o-nitrochlorobenzene and many other compounds. Naxonate G solutions are suggested for solvent extraction, speeding up chemical reactions, lowering reaction temperatures required for certain reactions, as a mutual solvent for organic chemicals in aqueous systems solubilizing textile oils, for preparation of aqueous solutions of dyes and in manufacture of cosmetics. Naxonate G is also of value as a solvent and extractant for lignin and pentosans. Available in semi-commercial quantities. Wyandotte Chemicals Corp.



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STANNOUS OXIDE

SnO. Mol Wt., 134.70. Sp. Gr., 6.95. Theo. Tin 88.1%. Heavy black powder which is readily soluble in acids. Decomposes in alkalis. Use: As an intermediate in preparing various stannous salts. Available in limited quantities. Metal & Thermit Corp.

STANNOUS SULFIDE

SnS. Mol. Wt., 150.76. Sp. Gr., 5.08. M.P., 880°C., B.P., 1230°C. Theo. Comp. Sn 78.7%, S 21.3%. Black crystalline solid. Tends to oxidize at high temperatures but oxidation is fairly slow at 500° to 600°C. Insoluble in H_2O but soluble in acids and alkalies. Use: In making bearing materials. Available in pilot plant quantities. Metal & Thermit Corporation.

STREPTOMYCIN SULFATE

An antibiotic produced by the organism, *Actinomyces Griseus* isolated as the sulfate salt. Effective against numerous gram negative bacteria. May be stored at room temperature 12 months without excessive loss in potency. Sterile, non-toxic and free from pyrogenic and vasoconstrictor substances. Present production averages about 800 milligrams pure streptomycin base per gram. Available in vials containing the equivalent of 1 gram pure streptomycin base. Uses: Pharmaceutical and veterinary medicament. Charles Pfizer & Co., Inc.

STRYCHNIDINE

$C_{21}H_{24}ON_2$. Mol. Wt., 320. M.P., 256°C. Colorless crystals. Use: Reagent for nitrate determination. Available in commercial quantities. Bios Laboratories.

STYRENE GLYCOL

$C_6H_5CHOHCH_2OH$. Mol. Wt., 138.16. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

SUBERIC ACID

$HOOC(CH_2)_6COOH$. Mol. Wt., 174.2. M.P., 140°C. B.P., 219°C. (10 mm.). Colorless crystals from water. Sparingly soluble in ether. Insoluble in chloroform. Use: Intermediate for the synthesis of drugs, dyes and high polymers. Available in commercial quantities. Bios Laboratories.

SUCCINBROMIMIDE (N-Bromo-Succinimide)

$C_4H_4O_2NBr$. Mol. Wt., 177.99. M.P., 175°C. Available Bromine, 44.7-45%. Pale yellow white crystals. Slightly soluble in water, soluble in warm alcohol, insoluble in ether and carbon tetrachloride. Suggested for use as a brominating agent in side chain reactions involving aliphatic and aromatic compounds. Available in limited quantities. National Aniline Division, Allied Chemical & Dye Corp.

SUCCINIMIDE

$C_4H_5O_2N$. Mol. Wt., 99.09. M.P., 125-126°C. White crystalline powder. Very soluble in water, soluble in alcohol and acetone, slightly soluble in ether, soluble in cold, concentrated sulphuric acid. Suggested for use in organic synthesis of pharmaceuticals, and germicidals. Available in limited quantities. National Aniline Division, Allied Chemical & Dye Corp.

SULFUR HEXAFLUORIDE

SF_6. Mol. Wt., 146.06. A colorless, very stable gas. M.P., 50.8°C. Sublimation Pt., 63.8°C. Critical temperature 45.6°C. Critical pressure 540 p.s.i.a. Vapor Pressure 308 p.s.i.a. at 20°C. Uses: As a gaseous dielectric in high voltage electrical equipment. Available in limited commercial quantities. General Chemical Co.

SULFUR HEXAFLUORIDE

SF_6. Mol. Wt., 146.06. Density of Liquid, 1.91 g/cm³. Density of Gas, 6.16 g/l (760.5 mm. pressure). Relative Gas Density, 5.10 (Av = 1). Critical Temperature, 45°C. Critical Pressure, ca. 525 lbs/in². Critical Density, reported as 0.78 g/cm³. Sublimation Temperature, -63.8°C. Heat of Sublimation, 5640 cal./mol. M.P., -50.8°C. Heat of Fusion, 1390 cal./mol. Heat Capacity (at constant volume), 22.43 cal./mol. at 50°C. Odorless. Solubility in Water, very slightly soluble. Shipped as a liquid in steel cylinders under about 350 lbs. pressure at 25°C. (77°F.) Chemical Properties: SF_6 is very inert chemically, non-toxic, and stable to at least 800°C. (1472°F.) Uses: Dielectric medium for closed electrical devices; refrigerant; insecticide propellent; inert atmosphere; gaseous diluent (liquid diluent, if under pressure). Available in limited commercial quantities. Pennsylvania Salt Manufacturing Co.

TETRAETHYL PYROPHOSPHATE

$C_8H_{20}O_7P_2$. Mol. Wt., 290.2. Sp. Gr., at 1.16 at 25°/4°C. Soluble in water and many organic solvents. It appears to have considerable promise as a contact insecticide, being effective against aphids, thrips and similar insects at very low concentrations. Laboratory tests show high toxicity (over 90%) to aphids at 1-10,000 dilutions. While it hydrolyzes in water, the action is sufficiently slow that diluted sprays are effective many hours after preparation. Outstanding control of citrus aphids has been obtained with dusts containing 3% T.E.P.P. at 45 pounds per acre, and as vapor sprays at 1 to 2 pounds per 100 gallons of water per acre. Not in commercial production as yet, but intensive laboratory and field studies are being carried on with this and related polyphosphate esters. Available in semi-works quantities. Eston Chemicals, Inc.

TETRAETHYL PYROPHOSPHATE

$(C_2H_5O)_4P_2O_3$. Mol. Wt., 290.2. Light straw-colored, mobile liquid. Sp. Gr., approximately 1.2. Completely miscible with polar and aromatic solvents and immiscible with paraffinic hydrocarbons. Has a high degree of biological activity, apparently through the inhibition of cholinesterase. Gradually hydrolyzes in presence of water, with accompany decrease in toxicity. Uses: Insecticide. Availability: Experimental quantities to qualified testing agencies. Monsanto Chemical Co.

TETRAETHYL PYROPHOSPHATE

Tetraethyl pyrophosphate is a colorless to faint yellow liquid of approximately 95% purity. Molecular Weight, 290. Specific gravity, 1.190 at 24°C. Refractive index, 1.4185 at 25°C. Decomposition point, 185°C. Soluble in water and common organic solvents. Insoluble or very slightly soluble in kerosene, V.M.P. naphtha, hexane. Where solvents contain hydroxyl groups, chemical reaction is probable. In dilute aqueous solutions tetraethyl pyrophosphate undergoes slow hydrolysis and after 24 hours it is 90% hydrolyzed; the products of hydrolysis are relatively harmless and non-toxic. Field tests on the insecticidal activity of tetraethyl pyrophosphate have indicated it to be very effective against certain classes of insects such as aphids and mites. Tests on tetraethyl pyrophosphate as a rodenticide have proven it is one of the most toxic substances investigated up to the present time. It posesses a MLD_{50} of less than 1 mg. per kilogram of body weight against mice, 7-10 mg. for hexaethyl tetraphosphate. Suggested uses: As a toxic ingredient in insecticidal sprays and dusts. As a rodenticide. Available in semi-works quantities. Victor Chemical Works.

TETRAETHYL PYROPHOSPHATE (Technical)

A mixture of neutral ethyl esters of several polyphosphoric acids, containing 40-45% tetraethyl pyrophosphate, by bio-assay. It is a brown liquid. Sp. Gr., 1.20. R.I., 1.420. It cannot be distilled at 1 mm. pressure without decomposition. It is thermally stable at temperatures up to 150° C., and the decomposition rate becomes rapid at about 200°C. It is miscible in all proportions with water and all organic solvents except aliphatic hydrocarbons. Hydrolysis occurs in water solution at a rate similar to that of hexaethyl tetraphosphate, the ultimate products being mono-, di-, and triethyl orthophosphate. A similar, but slower reaction occurs with alcohols. Preliminary tests indicate a toxicity of about 2.0 mk/kg. at MLD_{50} agaist mice. Uses: As an effective insecticide toward aphids and mites, and as a rodenticide. Available in commercial quantities. Victor Chemical Works.

TETRAETHYLTHIURAM DISULFIDE

$[(C_2H_5)_2NCS_2]_2$. Mol. Wt., 296.5. Sp. Gr. at 20°/20°C., 1.17. M.P., approximately 69°C. Appearance, cream colored powder. Uses: Vulcanizing agent, primary accelerator and secondary accelerator for rubber. Retarder for neoprene. Useful with natural rubber, styrene rubber, nitrile rubber, neoprene and butyl rubber. Available in commercial quantities. Sharples Chemicals Inc.

TETRAHYDROFURAN

C_4H_8O. Mol. Wt., 72.06. Sp. Gr. 20°C/N .888. R.I., 20°C/ND 1.4070. B.P., 66°C. Sol. in H_2O at 20°C., Miscible. Odor, Ethereal. Color, water-white. Flash Pt., +5°F. (open cup). Chemical properties: Tetrahydrofuran reacts with carbon monoxide and water under conditions of high temperature and pressure to form adipic acid. Succinic acid is formed from tetrahydrofuran through electrolytic oxidation and butadiene formed upon dehydration. Dichloro tetrahydrofuran occurs through direct chlorination and various pyrrolidene compounds are formed when tetrahydrofuran is treated with ammonia. Uses: Exceptional slovent for plastics and resins, particularly of polyvinyl chloride type. Chemical intermediate. The wide range of organic compounds which it dissolves and its chemical stability suggests its use as a reaction medium for various chemical processes. High

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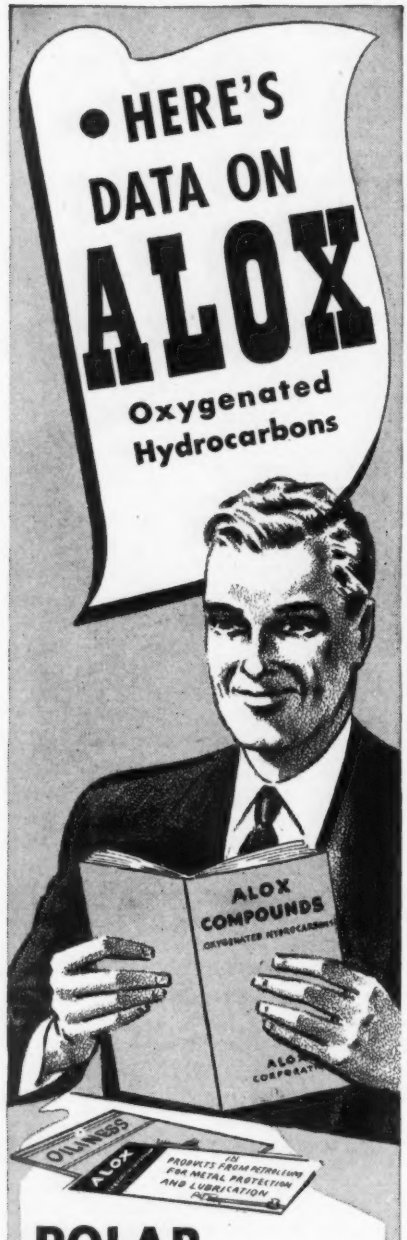

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TETRAHYDROPYRAN (Pentamethylene Oxide)

$CH_2CH_2CH_2CH_2CH_2$ (O ring). Mol. Wt., 86.13. B.P., 88°C. at 760 mm. Sp. Gr., 0.8814 at 20°/4°C. R.I., N20/D, 1.420. Flash Pt., —20°C. Colorless mobile liquid with ethel-like odor. Sol. in water, but less soluble in hot than cold water. Misc. with most common organic solvents. Uses: Solvent in lacquer formulations. Solvent for resins, plastics, rubbers, and nonresinous materials; as a chemical intermediate in the preparation of chlorotetrahydropyrans, omega-haloamyl esters, and dihalides. Available in limited quantities. E. I. du Pont de Nemours & Co., Inc.

TETRAMETHYLENEDIAMINE

$H_2N(CH_2)_4NH_2$. Mol. Wt., 88. Colorless crystals with strong odor. M.P., 27°C. B.P., 158-159°C. Soluble in water with strongly basic reaction. Use: Chemical intermediate. Available in commercial quantities. Bios Laboratories.

TETRAMETHYLTHIURAM DISULFIDE

$[(CH_3)_2NCS_2]_2$. Mol. Wt., 240.4. Sp. Gr. at 20°/20°C., 1.29. M.P., approximately 147°C. Appearance, white powder. Uses: Vulcanizing agent, primary accelerator and secondary accelerator for rubber. Retarder for neoprene. Useful with natural rubber, styrene rubber, nitrile rubber, neoprene and butyl rubber. Available in commercial quantities. Sharples Chemicals Inc.

2-THIO-4-KETO-THIAZOLIDINE (Coodrite Rhodanine)

$C_3H_3NOS_2$. Mol. Wt., 133.18. Sp. Gr., 0.868. Bulk density, 0.617. Soluble in hot water, ethyl ether, and methanol. Insoluble in cold water and hexane. Melting point, decomposes at 166°C. % Heat loss in 2 hrs. at 105°C., 0.67%. Physical state, finely crystalline, light yellow color. Chemical structure, 5 membered heterocyclic ring containing N and S. Chemical properties: Contains active methylene group which condenses readily with aromatic and aliphatic aldehydes. Resulting condensates undergo ring fission by action of barium hydroxide to form arylthiopyruvic acids. Also contains active hydrogen which may be substituted with metals. Uses: As an intermediate for preparation of amino acids, B-arylalanines, arylacetonitriles, arylacetic acids, and B-arylethylamines, especially where these end products contain acid sensitive groups. Available in limited experimental quantities. B. F. Goodrich Chemical Co.

THIOURACIL

$C_4H_4ON_2S$. Mol. Wt., 128. Prisms from water. M.P., 340°C. dec. Soluble in dilute alkalies and ammonia. Uses: Pharmaceutical, vulcanization of rubber, intermediate. Available in commercial quantities. Bios Laboratories.

TITANOUS OXALATE

$Ti_2(C_2O_4)_3.10H_2O$. Mol. Wt., 540.02. Yellow crystal, soluble in water. Insoluble in alcohol and ether. Use: Mordant in textile dyeing. City Chemical Corp.

TITANOUS SULFATE

$Ti_2(SO_4)_3.8H_2O$. Mol. Wt., 528.14. Violet crystal (anhydrous salt is green). Soluble in water and dilute mineral acids. Use: Reducing agent; stripper. City Chemical Corp.

m-TOLUIC ACID

$C_8H_8O_2$. Crystalline solid. Mol. Wt., 136.14. M.P., 111-113°C. B.P., 263°C. Sp. Gr., 1.054 at 112°/4°C. Very soluble in ethanol and ether. Soluble in 1170 parts of water at 15°C. and in 60 parts of water at 100°C. Is volatile with steam. Sublimes. Uses: As an intermediate for synthesis. Availability: Research quantities. Monsanto Chemical Co.

o-TOLUIC ACID

$C_8H_8O_2$. Crystalline solid. Mol. Wt., 136.14. M.P., 107-108°C. B.P., 259°C. at 751 mm. Sp. Gr. 1.062 at 115°/4°C. Soluble in hot water, and benzene. Very soluble in ethanol. Is volatile with steam. Uses: As an intermediate for synthesis. Availability: Research quantities. Monsanto Chemical Co.

p-TOLUIC ACID

$C_8H_8O_2$. Mol. Wt., 136.14. M.P., 181°C. B.P., 274-275°C. Crystalline solid. Very soluble in methanol, ethanol and ether. Sparingly soluble in water. Is volatile with steam and sublimes. Uses: As an intermediate for synthesis. Availability: Research quantities. Monsanto Chemical Co.

m-TOLYLENE DIISOCYANATE

$CH_3.C_6H_3(NCO)_2$. Mol. Wt., 174.16. B. range, 82-85°C. at 1 mm. M. range, 19.6-21.8°C. Odor, medicinal. Color, clear, colorless to yellow. Uses: Organic synthesis, textile-treating processes, polymers and plasticizers. Availability: Pilot plant quantities. Monsanto Chemical Co.

2, 4, 6-TRIACETAMIDOTOLUENE (C. P.)

$(CH_3CONH)_3C_6H_2CH_3$. Mol. Wt., 263.29. M.P., 306.5-308.5°C. Very slightly soluble in warm water. Soluble in glacial acetic acid. No odor. White crystals. Chemical properties: A stable chemical compound. Use: A possible pharmaceutical chemical or intermediate. Available in research and commercial quantities to order. The Edwal Laboratories, Inc.

2, 4, 6-TRIACETOXYBENZENE

$(CH_3COO)_3C_6H_3$. Mol. Wt., 252.22. M.P., 103°-104°C. No odor. White crystals. Chemical properties: A stable chemical compound, with groups partially blocking the otherwise enhanced ring-hydrogen activity. Available in research and commercial quantities to order. The Edwal Laboratories, Inc.

2, 4, 6-TRIACETOXYTOLUENE (C. P.)

$(CH_3COO)_3C_6H_2CH_3$. Mol. Wt., 266.25. M.P., 71°-72°C. No odor. White crystals. Chemical properties: A stable chemical compound, with groups partially blocking the otherwise enhanced ring-hydrogen activity. Available in research and commercial quantities to order. The Edwal Laboratories, Inc.

SYM-TRIAMINOBENZENE.3HCl (Technical)

$(NH_2)_3C_6H_3.3HCl$. Mol. Wt., 226.83. M.P., decomposes. Soluble in 5 parts water at 20°C. No odor. Tan to brown crystals. Chemical properties: A stable chemical compound as the triacid salt; decomposes slowly in free base form with evolution of ammonia. Uses: Resin component; dye intermediate. Available in research and commercial quantities to order. The Edwal Laboratories, Inc.

2, 4, 6-TRIAMINOTOLUENE.3HCl (Technical)

$(NH_2)_3C_6H_2CH_3.3HCl$. Mol. Wt., 240.86. M.P., decomposes. Solubility in water, app. 1 to 3½ parts at 20°C. Insoluble in alcohol. No odor. Tan to brown crystals. Chemical properties: A stable chemical compound as the triacid salt; darkens with decomposition as the free base. Uses: Resin component; dye intermediate. Available in research and commercial quantities to order. The Edwal Laboratories, Inc.

1, 2, 4-TRIBROMOBENZENE

$Br_3C_6H_3$. Mol. Wt., 314.83. Use: Chemical synthesis. Available in experimental quantities. The Dow Chemical Co.

1, 2, 3-TRIBROMOPROPANE

$C_3H_5Br_3$. Mol. Wt., 280.84. B.P., 100°C. at 18 mm. Insoluble in water. Sweet, water-white liquid. Uses: Organic synthesis. Available in experimental quantities. Halogen Chemicals Inc.

TRIBUTYL PHOSPHITE

$C_{12}H_{27}PO_3$. Mol. Wt., 250.25. B.P., 121-123°C. at 8 mm. Sp. Gr., 0.9253 at 20°/4°. Colorless liquid. Miscible with the usual organic solvents. Immiscible with water. Gradually hydrolyzes in contact with water. Uses: As a stabilizer, antioxidant and intermediate for synthesis. Availability: Research quantities. Monsanto Chemical Co.

TRIDECANOL

$C_{13}H_{27}OH$. Mol. Wt., 200.22. M.P., 30.63. B.P., 155-156° at 15 mm. Insoluble in water; soluble in alcohol and ether. Chemical properties are similar to other higher fatty alcohols. Use: Preparation of perfumes, pharmaceuticals and other organic chemicals. Columbia Organic Chemicals Co., Inc.

TRIDECYL BROMIDE

$C_{13}H_{27}Br$. Mol. Wt., 263.22. Density, 1.025 at 20°C. B.P., 158-160°C at 15 mm. Colorless liquid; insoluble in water. Chemical properties are those of a primary alkyl bromide. Suggested use: Organic synthesis. Columbia Organic Chemicals Co., Inc.

TRIETHYL PHOSPHITE

$C_8H_{15}PO_3$. Mol. Wt., 166.15. B.P., 157°C. Sp. Gr., 0.9605 at 17°/0°. Colorless liquid. Miscible with usual organic solvents. Immiscible with water. Gradually hydrolyzes in contact with

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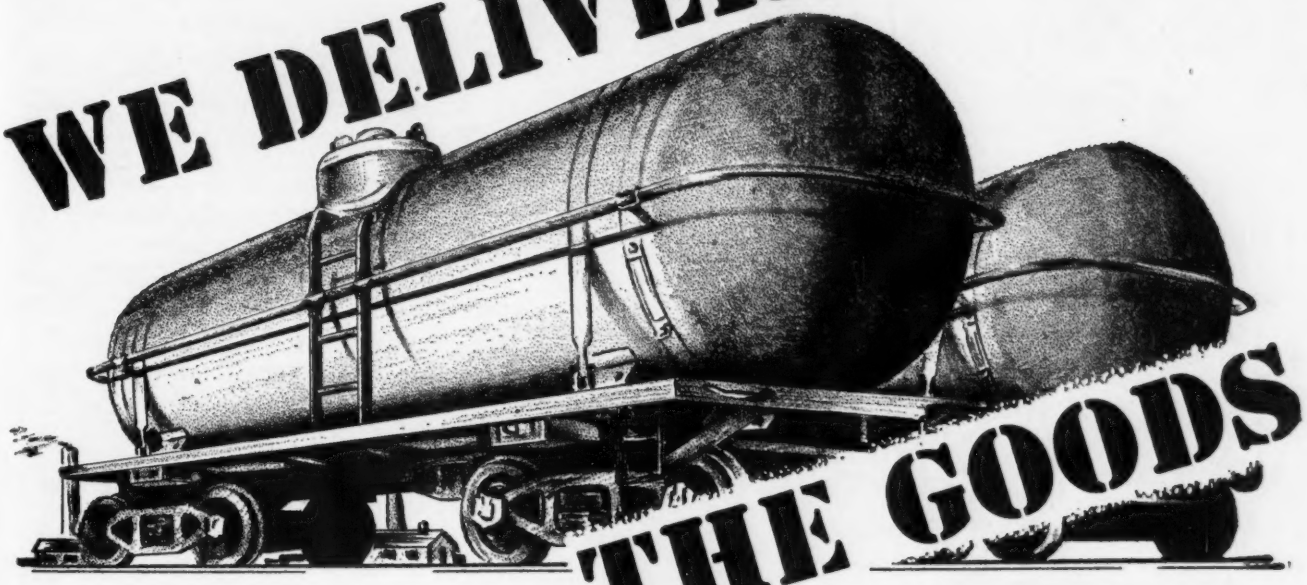

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19

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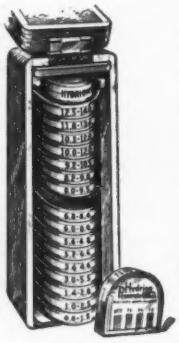

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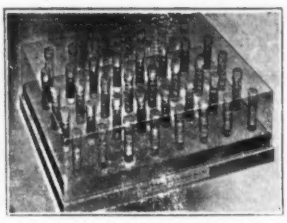

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water. Uses: Stabilizer, antioxidant, solvent and intermediate for synthesis. Availability: Research quantities. Monsanto Chemical Co.

TRIFLUOROPENTACHLOROPROPANE

$CF_3CCl_2CCl_3$. Mol. Wt., 270.05. F.Pt., 109°C. B.P., 153°C. Uses: Preparation of coating agents, insect proofing agents, insulating varnishes, adhesives. Columbia Organic Chemicals Co., Inc.

2, 4, 6-TRIMETHOXYBENZENE

$(CH_3O)_3C_6H_3$. Mol. Wt., 168.19. M.P., 52-55°C. B.P., 255.5°C. Insoluble in water. Very soluble in alcohol, ether, and benzene. No odor. White crystals. Chemical properties: A stable chemical compound with slightly enhanced ring-hydrogen activity. Uses: In the synthesis of organic chemicals and possibly pharmaceuticals, such as $(CH_3O)_3C_6H_2NH\text{-}COCH_2COCH_3$. Available in research and commercial quantities to order. The Edwal Laboratories, Inc.

TRIPROPYLENE GLYCOL, METHYL ETHER (Dowanol 62B)

$CH_3OC_3H_6OC_3H_6OC_3H_6OH$. Mol. Wt., 206.3. Sp. Gr. at 25°C., 0.961. B.P. at 760 mm. Hg, 242°C.; at 10 mm. Hg, 116°C. Viscosity at 25°C., 5.5 cps. R.I. at 25°C., 1.427. Fire Pt., 127°C. Solubility: Completely miscible with water, VMP naphtha, acetone, ethanol, benzene, carbon tetrachloride, ether, methanol, monochlorobenzene, and petroleum ether. Due to its low vapor pressure and high solvent power this product is of interest to leather finishers and manufacturers of inks, dyes, and stains. It also has shown promise as an ingredient in hydraulic fluids. Available in semi-commercial quantities. The Dow Chemical Co.

l(+)-VALINE

$(CH_3)_2CHCH(NH_2)COOH$. Mol. Wt., 117. Natural isomer. M.P., 315°C. Colorless plates. Spec. rotation, $(\alpha)_D = +6.42°$ in water. Uses: Culture media, microbiological testing, biochemical investigations, nutritional studies. Available in commercial quantities. Bios Laboratories.

VINYL ETHYL ETHER

$CH_2{=}CHOC_2H_5$. Mol. Wt., 72.1. B.P., 33.5°C at 760 mm. Sp. Gr., 0.7541 at 20°/20°C. R.I., 1.3774. Liquid at 20°C. Uses: Polymers and copolymers used in surgical tapes, pressure-sensitive, and glass-laminating adhesives. Uses: Copolymers in coatings and lacquers, as modifiers for alkyd and polystyrene resins, and as plasticizers for nitrocellulose and other plastics. Can be reacted with halogens, hydrogen halides, and hypohalous acids to form products of interest in further synthesis. Available in limited commercial quantities. Carbide and Carbon Chemicals Corp.

VINYL ETHYLHEXYL ETHER

$CH_2{=}CHOCH_2CH(C_2H_5)C_4H_9$. Mol. Wt., 156.3. B.P., 177.5°C. at 760 mm. Sp. Gr., 0.8102 at 20°/20°C. R.I., 1.4273 at 20°C. Colorless liquid. Uses: Polymers for surgical tape, pressure-sensitive, and glass-laminating adhesives, copolymers in coatings and lacquers, as modifiers for alkyd and polystyrene resins, and as plasticizers for nitrocellulose and other plastics. Available in experimental quantities. Carbide and Carbon Chemical Corp.

VINYL ISOPROPYL ETHER

$CH_2{=}CHOCH(CH_3)_2$. Mol. Wt., 86.2. B.P., 55.7°C. at 760 mm. Sp. Gr., 0.7545 at 20°/20°C. R.I., 1.3844. Liquid at 20°C. Uses: Polymers for surgical tape, pressure-sensitive, and glass-laminating adhesives. Copolymers in coatings and lacquers, modifiers for alkyd and polystyrene resins, and plasticizers for nitrocellulose and other plastics. Available in experimental quantities. Carbide and Carbon Chemicals Corp.

ZINC DIBUTYLDITHIOCARBAMATE

$Zn[(C_4H_9)_2N(S)CS]_2$. Mol. Wt., 474.1. Sp. Gr., at 20°/20°C., 1.24. M.P., approx. 105°C. Appearance, white powder. Use: Latex compounding. Available commercially. Sharples Chemicals Inc.

ZINC DIETHYLDITHIOCARBAMATE

$Zn[(C_2H_5)_2N(S)CS]_2$. Mol. Wt., 361.9. Sp. Gr. at 20°/20°C., 1.47. M.P., approx. 174°C. Appearance, white powder. Uses: Latex compounding. Primary or secondary accelerator for rubber. Available commercially. Sharples Chemicals Inc.

ZINC DIMETHYLDITHIOCARBAMATE

$Zn[(CH_3)_2N(S)CS]_2$. Mol. Wt., 305.8. Sp. Gr. at 20°/20°C., 1.65. M.P., approx. 248°C. Appearance, white powder. Uses: Primary or secondary accelerator for rubber. Available commercially. Sharples Chemicals Inc.

ZINC DIPROPYLDITHIOCARBAMATE

$Zn\,[SC(S)N\,(C_3H_7)_2]_2$. Mol. Wt., 418. Light pink powder. Sp. Gr. at 20°/20°C., 1.23. Melting range, 107.5-110.5°C. Odor, faint amine. Use: Rubber accelerator. Available in semi-commercial quantities. Sharples Chemicals Inc.

HYDRATED ZIRCONIA (Technical)

$ZrO_2.XH_2O$. Typical Analysis: 55-58% solids. Of the solids—ZrO_2, 88.0%. SiO_2, 10.5%. Na_2O, 0.3%. TiO_2, 0.7%. Fe_2O_3, 0.5%. Apparent density, 103-109 lbs./cu.ft. Insoluble in water and organic solvents. 95-97% of the ZrO_2 is soluble in mineral acids. Physical State: Moist paste. Color: White. Properties and Uses: This semi-solid gel has not been ignited and is in a reactive form. The solubility of the ZrO_2 content in mineral acids makes it a valuable starting material for other zirconium derivatives. The gel can be used alone or mixed with other hydrated materials for catalytic purposes. The Hydrated Zirconia may be readily dried to a chalk-like powder which may be calcined to yield a porous oxide. This product may possibly be used as an extender of filler. It also has a possible ue in the preparation of color lakes. Available in pilot plant quantities. Rohm & Haas Co.

Chemical Specialties

ACRYLIC COPOLYMER EMULSION 350-26

A fine particle, high solids water-thin emulsionsion recommended for use as a complete starch replacement, yielding a permanent finish for cotton and rayons. Stability 9 to 12 months. pH, 5-6. Monomer content less than 0.1%. American Resinous Chemicals Corp.

ADHESIVE 669-1

A quick grab aqueous adhesive depositing films of good strength and water resistance. Will adhere to most non-porous surfaces including enamel, paint, plastic and wax. Recommended uses include case-sealing, frozen food containers, foil and film to paper laminations. May be admixed with starches and dextrins to impart tack, flexibility, and water-resistance. American Resinous Chemicals Corp.

ADHESIVE BASE 493-49B

Emulsion of modified alkyd resins compounded with acid acceptor and antioxidant, designed for use with Neoprene Latex, for pressure sensitive operations in the shoe industry. Color of dry film — clear, pale amber. For applications where cost is primary and film color secondary a modified adhesive Tackifier 493-50C is available. Solids 42.5%-pH 9.0-9.5. Wt. per gallon 8.5 lbs. American Resinous Chemicals Corp.

ADVAWET 33

A purely synthetic, non-ionic surface active agent containing no oils, fats, soaps, or alcohol sulphates. Especially developed for emulsion paints, it combines non-ionic, emulsifying, and wetting-out properties with those of a 100% active surface agent which gives very little foaming. It is a viscous, oily, amber liquid, soluble in water in all proportions and soluble in most organic solvents and oils. It is compatible with soaps, sulphonated oils, synthetic detergents, including anionic and cationic types, and is an excellent coupling agent. Sp. Gr., 1.01; pH, 6.5 — 7.0 (% water solution). Advance Solvents & Chemical Corp.

ADVAWET NA-6

A purely synthetic, non-ionic surface active agent free from oils, fats, soaps, or alcohol sulphates. It is a brilliant amber, viscous, oily liquid, soluble in water in all proportions, and soluble in most organic solvents, mineral and vegetable oils. It is compatible with soaps, sulphonated oils, synthetic detergents, including anionic and cationic types, and has good foaming properties. Recommended for use as a textile wetting agent, in coupled textile wetting agent systems, in degreasing compounds and solutions, and in metal cutting compounds and emulsions. Sp. Gr., 1.061; pH, 5.5-6.0 (1% water solution). Advance Solvents & Chemical Corp.

ALDO 33

Improved, neutral, edible grade of glyceryl mono stearate. Uses: Emulsifier for the baking,

CHEMICAL EXACTNESS helps produce new, tiny battery for hearing aids

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Thousands who are hard-of-hearing now enjoy new comfort and relief.

A new development makes hearing aid instruments lighter, more compact, and more effective. This is the Mallory Dry Battery, a tiny but incredibly powerful and long-lasting battery.

Less than one-third the size of the conventional dry cell but with a capacity just as great, the Mallory Dry Battery is one of the smallest "A" batteries produced.

Developed during the war for use in walkie-talkies and mine detectors, the Mallory Dry Battery is used today chiefly in hearing aids. But it has a practically unlimited future in midget size radios, home fire alarm systems, handie-talkie sets, and other electronic devices.

One of the factors essential to the success of this new type battery is the use of chemicals to exacting specifications. The J. T. Baker Chemical Co. is supplying such a chemical for this battery.

Chemical exactness is an art long associated with the name of J. T. Baker Chemical Co. A pioneer in reagent laboratory chemicals with the *actual analysis on the label*, Baker has been trained to produce purity to the decimal for industry to the most exacting specifications.

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ice-cream, and cosmetic industries; plasticizer; lubricant. Bead form, white, practically tasteless and odorless; M.P., 59-60°C; acid value 4; sap value 160-166. Glyco Products Co.

ALKIRON BLUE—38 T 45

This is a ferric-ferrocyanide type blue, nickelated and specially formulated so as to produce a very high degree of resistance to alkalies. This Iron Blue is especially suited for baking enamels formulated from synthetic resin vehicles, due to its ease of grinding in this type of vehicle. It grinds out readily to produce a deep, greenish-blue shade, which does not exhibit the usual reddish bronzy cast obtained with the ordinary iron blue pigment. The finished film coating, upon immersion in 3% caustic soda solution, will not undergo appreciable changes in shade for periods up to several hours. Sp. Gr., 1.81; 1 lb. bulks Gal., .06632; Oil Absorption 116. Ansbacher-Siegle Corp.

ALROSENE 31

A neutral 31% active modified alcohol sulfate in granular form (density -0.7); suitable for use in household detergents. Alrose Chemical Co.

ALROTERGE

Neutral 35% active ingredient alkyl aryl sulfonate in flake form (density -0.3); for use as detergent, penetrant. Alrose Chemical Co.

ALRO WATER SOFTENER A

An organic type sequestering agent for calcium soaps; for use in clarification of liquid soaps and enhancement of foam; one cc. is equivalent to approximately 2 grains hardness; stable at high alkalinities and at the boil. Alrose Chemical Co.

AMECCO DETERGENT 198-A PASTE

An anionic, 30% active, synthetic detergent and wetting agent exhibiting outstanding detergent properties on protein materials. It is suitable for the textile, leather, cosmetic, paper, pigment, metal cleaning and electroplating industries. Moisture, 65%; inorganic salts, less than 5%; pH, neutral; color, off-white; odor, pleasant. Amecco Chemicals, Inc.

AMINE—O

A high molecular weight bivalent tertiary amine; surface-active agent; emulsifier for mineral oil, inks, sprays, asphalt; flotation agent. Average Mol. Wt., 380; B.P., 250-280°C / 2 mm. Alrose Chemical Co.

AQUAPELANT RED—C 21-006

This is an alumina lake of Rhodamine B on aluminum—containing sub-stratum, which is especially suitable for the coloring of lipsticks. When the lipstick is mixed with water, it does not exhibit the dyestuff bleeding characteristic of the usual type of alumina Rhodamine lake, and thus produces a cleaner and sharper stain on the lips. Another advantage is the absence of the "bluing out" during manufacture, which is characteristic of the usual type of alumina Rhodamine lake, whereby a batch of the colored lipstick mass will gradually change shade, due to solubilizing of the dyestuff. This new product is also more stable to light, and does not suffer as much deterioration in color quality when the finished goods are exposed in window display. Sp. Gr., 1.15; Oil Absorption, 60.20. Ansbacher-Siegle Corp.

ARRESTO-MOTH

A buff colored, free-flowing powder containing a mixture of DDT (dichloro-diphenyl-trichloroethane) and an adsorbent powder for use by dry cleaners in a special process for impregnation of clothing with DDT to prevent moth damage. The cloth bags containing Arresto-Moth are placed in suitable equipment, where the DDT is extracted by solvent, and the adsorbent powder serves to keep the treating solution substantially free from odors, color, fatty acids, fatty acid decomposition products, and other foreign matter picked up from the clothing by the solvent. The process may be used for treatment of extraction batches as desired, without contamination of the entire dry cleaning system. Under normal conditions Arresto-Moth retains its protective properties for at least one year or until the articles are again dry cleaned. This product is commercially available in four pound cloth bags, packed 12 per case. Pennsylvania Salt Manufacturing Co.

AV-50

A plasticizer made from readily available raw materials that may be used as a major substitute for castor oil in nitrocellulose lacquers and coating compositions. Its lower viscosity allows higher solids lacquers, good levelling, faster dry and decreased machine times in knife coating application. Atlas Powder Co.

AV-51

A plasticizer made from readily available raw materials that may be used as a major substitute for castor oil in nitrocellulose lacquers and coating compositions. Its lower viscosity allows higher solids lacquers, good levelling, faster dry and decreased machine times in knife coating application. Atlas Powder Co.

BEE GRINDING OIL 89

A grinding oil which will give an extreme mirror finish. Recommended dilution: 1 gallon of Bee Grinding Oil 89 to 100 gallons of water. Bee Chemical Co.

BRASSLYFE 30

A corrosion inhibitor specific for brass and other copper-containing alloys. A new product containing a 30% solution of the active ingredient in a special solvent combination. These solvents are rather versatile, and therefore, mix well with almost any industrial lubricant. The addition of ½ to 3 percent drastically depresses any corrosive effect on brass. Bee Chemical Co.

BROMOFUME SOIL FUMIGANTS

Solutions of ethylene dibromide in volatile organic solvent. For use in treating soil prior to planting to eliminate wireworms and nematodes. Prepared in three standard concentrations for convenience of user, viz-Bromofume-40 with 3.6 pounds, Bromofume-20 with 1.8 pounds and Bromofume-10 with 0.9 pounds ethylene dibromide per gallon. Recommended for application at from 35 to 50 pounds of eythlene dibromide per acre depending on infestation and soil conditions. Bromofume can be readily applied with standard soil fumigation equipment and is not corrosive to all common metals used in construction. In addition to the straight fumigation action, there is some evidence that Bromofume has a stimulating effect on subsequent plant growth. Eston Chemicals, Inc.

BUNA IMPREGNANT 451-26

Resin-modified, curing-type, Buna latex dispersion. Gives rapid and complete saturation for high void paper stock and fabrics. Advantages over standard Buna compositions are low cost, prolonged flexibility, high tear resistance and tensile strength, with improvement rather than deterioration on aging. Treated stock may be coated with nitrocellulose lacquers without discoloration. 37% solids. American Resinous Chemicals Corp.

BURAMINE

A product consisting of approximately 70% butylurea and 30% urea. A white, free-flowing flaked material. Use: For the production of resins. Available commercially. Sharples Chemicals, Inc.

C-66

An aromatic specialty with a fresh neutral floral note. A colorless liquid solidifying slightly below room temperature. Soluble in alcohol and all essential oils. C-66 is useful in the composition of Lily of the Valley, or in any blend, floral or otherwise where Lily of the Valley would be an important constituent. The Dow Chemical Co.

CALCOSOL BROWN BR PASTE

A new anthraquinone vat dye which produces chocolate brown shades with excellent fastness properties to light, washing, chlorine and peroxide bleaching on rayon and cotton. Recommended for all of usual methods of vat dye applications. Calco Chem. Div., Amer. Cyanamid.

CALCOSOL COPPER BROWN PASTE

A new homogenous anthraquinone vat dye producing a red shade brown on cotton and rayon. Displays very good light fastness even in light shades, also excellent fastness to washing, chlorine, and peroxide bleaching. Suitable for usual fast vat dye applications and as a shading dye for grays and dusty roses. Calco Chem. Div., Amer. Cyanamid.

CALCOTONE PASTES

The Calcotone Pastes, White T, Yellow G, Yellow M, Orange R, Scarlet Y, Red 3B, Red MB, Pink FF, Blue G, Blue R, Green G, Green M, Brown BB, Brown DK, Violet 6R, Black, are a line of aqueous colloidal dispersions of organic and inorganic pigments for general use with water-soluble binders. They are recommended for low cost textile printing and various other miscellaneous applications. Textile prints of most of these colors can be coated with vinyl films without bleeding into the vinyl. When applied by the recommended procedure, the group as a whole displays good fastness to light, chlorine, dry cleaning, washing and perspiration. Calco Chem. Div., Amer. Cyanamid.

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"CARBOWAX" COMPOUND PF-45

A modification of the "Carbowax" family, having extreme toughness and resilience. Thin layers are moderately flexible. Suggested for textile, paper, ceramic, adhesive, and metal industries for use in sizing, lubricant, binding, and casting applications. M.P. range, 50° to 55°C. Solubility in water, greater than 20% by weight at 20°C. Viscosity of 10% solution in water, 20 to 30 cps. at 20°C. Sp. Gr. of 10% solution in water, 1.05 at 25°C. Available in limited quantities. Carbide and Carbon Chemicals Corp.

CATIOSAN

A cationic surface-active germicide and detergent in paste form especially suitable for impregnation of paper and cloth. Available in developmental quantities. Industrial Division, Onyx Oil & Chemical Co.

CATIOSAN T

A cationic surface-active detergent in paste form possessing unusual germicidal characteristics. Suitable as a detergent sanitizer in impregnation applications for the preparation of dental, medical, and clinical supplies. Available in developmental quantities. Industrial Division, Onyx Oil & Chemical Co.

"CELLOSIZE" HYDROXYETHYL CELLULOSE WSCM

A new aqueous grade of "Cellosize" hydroxyethyl cellulose designed for selective neutralization. The use of 2-ethylhexoic acid, or unneutralized sulfonated oils, to combine with the free alkali present produces soft pliable films requiring no additional plasticizer. Suggested for use in textile sizing and paper coating, and in emulsion stabilization. Hydroxyethyl cellulose, 19 to 20% by wt. Sodium hydroxide, 6 to 7% by wt. Available in commercial quantities. Carbide and Carbon Chemicals Corp.

"CELLOSIZE" HYDROXYETHYL CELLULOSE WSH

A new aqueous grade of "Cellosize" hydroxyethyl cellulose in 4 viscosity types, designated as WSHL, WSHM, WSHX and WSHH. Has somewhat greater body than the WSL grade of material and is generally more economical to use. Particularly suggested for thickening applications, or in sizing or coating uses when a flexible film is not required. Hydroxyethyl cellulose content, 8 to 10% by wt. Inorganic salt, 4.5 to 5.5% by wt. Available in commercial quantities. Carbide and Carbon Chemicals Corp.

CHLORON 114

A chlorinated hydrocarbon similar in properties and uses to Chloron 120. Empirical formula, $C_{16}H_{33}Cl$; 14% chlorine; Sp. Gr., 0.885 at 25°C.; Boiling range, 135-160°C. at 6mm.; color, light straw. Amecco Chemicals, Inc.

CHLORON 120

A chlorinated hydrocarbon consisting principally of secondary monochlorides and suitable for emulsion and solvent type cleaning compounds. It undergoes Friedel-Crafts syntheses to yield alkylated aromatic compounds. Empirical formula, $C_{16}H_{31}Cl$; 20% chlorine; Sp. Gr., 0.920 at 20°C.; Boiling range, 110-155°C. at 10mm.; color, light straw. Amecco Chemicals, Inc.

CONCRETE WATERPROOFER 461-30

Resin lacquer which can be used as a sealer and waterproofer on concrete and terrazzo floors. Forms a tough, flexible abrasion resistant film, possessing excellent resistance to acids and alkali. Will not soften at temperatures below 390°F. American Resinous Chemicals Corp.

CREPE SOLE CEMENT

Adstik crepe sole cement securely bonds synthetic crepe rubber soles made from either Neoprene or Buna N. Can be used for adhering crepe to crepe, crepe to leather, crepe to fabric or crepe to rubber. Has overnight retack, eliminates the need for crepe midsoles and remains permanently flexible. Available in one and five gallon cans as well as in 55 gallon drums. Adhesive Products Corp.

CYCLOMENTH

A high boiling cyclic Alcohol with a Menthol-like aromatic odor. M.P. approx. 40°. Soluble in all organic solvents and oils but practically insoluble in water. Use: As a low-priced Menthol substitute for externally used drugs and cosmetics to which it imparts the characteristic odor and cooling effect of Natural Menthol. Chemo Puro Mfg. Corp.

DIMETHYL HYDANTOIN-FORMALDEHYDE RESIN (DMHF)

Average Mol. Wt., 240-300. M.P., 60°C., minimum. Nearly colorless, brittle lumps. Odorless or faint caramel-like odor. Hygroscopicity: absorbs 4-5% moisture in 3 hrs. when powdered and exposed to air at 26°C. and 96% R.H. Sol. in water and most common organic solvents. pH of 10% aqueous solution, 4-6.5. Plasticizers: Glycerol, triethylene glycol, and "Carbowax" compound 1500. Compatible in water solution with dextrin, starch, gelatin (glue), sodium starch glycolate, "Elvanol" polyvinyl alcohol, casein, and sodium carboxymethyl cellulose. Compatible, both in methanol solutions and in films, with "Elvacet" polyvinyl acetate. Uses: In textile sizing, paper coating and sizing, as a modifying agent for starch and gelatin adhesives, and as a blending agent for aqueous solutions of gums and resins. Development quantities available. E. I. du Pont de Nemours & Co., Inc.

DU PONT "MILDEX" MILDEW PREVENTIVE

Active Ingredients: Camphor — Paraformaldehyde Compound. Vapors are fungicidal and will prevent development of mildew within closed containers. Suggested for protecting packaged products made of textiles, plastics or leather. Can be used for mildew prevention in the home, in closets, trunks and packages. Protects wrapped awnings, rugs, equipment, tarpaulins, etc. E. I. du Pont de Nemours & Co.

EMCOL 888

Polyalkyl naphthalenemethylpyridinium chloride; low cost quaternary ammonium compound for use as germicide, textile assistant, industrial and restaurant sanitizing agent. Effective over a wide pH range. 40% aqueous solution. Color, red. Odor, slight. Phenol coefficient of active ingredient: 590 against E. typhi; 790 against Staph. aureus (20°C.). pH about 6. Surface tension (0.2%) 39.4 dynes/cm. The Emulsol Corp.

EMCOL 3178-S

Complex higher alcohol sodium sulfate. Detergent and wetting agent for use in textile field, car washing, rug cleaning, etc. Color, amber liquid. Total solids 39%; active ingredient 30%. pH (1%) about 8. Surface tension (0.1%) 31 dynes/cm. Profuse foamer. The Emulsol Corp.

BUTADIENE

for preparing new chemicals and polymers

(rubber-like materials, plastics, protective coatings, adhesives, reactive oils)

As marketed by Enjay, butadiene has a minimum purity of 98 per cent by weight. In appearance it is clear and free of entrained matter.

PHYSICAL PROPERTIES*

Formula	$CH_2 : CH\,CH : CH_2$	**Melting Point, deg. C.**	**-113**
State, at room temperature	**Gas**	**Boiling Point, deg. C.**	**-3**
Molecular Weight	**54.09**	**Solubility in Water**	**Insoluble**
		Alcohol	**Very soluble**
Density, grams per milliliter	$0.650^{\frac{-6}{4}}$	**Ether, etc.**	**Infinitely soluble**

**Handbook of Chemistry and Physics, 28th edition, 1944.*

For further information, contact

ENJAY COMPANY, INC.

(Formerly Standard Alcohol Company)

"The Original Synthetic Solvent Manufacturers"

26 Broadway **New York 4, N Y.**

Midwest Division: 221 North LaSalle Street, Chicago 1, Illinois

Pfizer PLASTICIZERS

TRIETHYL CITRATE ★
Easily compatible with most resins. Low oil solubility makes it of especial interest as a plasticizer for products which may come in contact with fats and oils.

ACETYL TRIETHYL CITRATE ★
Less volatile and more water-resistant than the unacetylated ester.
Particularly recommended for cellulose acetate.
Possesses good oil resistance.

TRIBUTYL CITRATE ★
A general-purpose plasticizer of low volatility and good water resistance which is compatible with most resins.
Has proved to be an excellent foam-breaker in many cases.

ACETYL TRIBUTYL CITRATE ★
Its very low volatility and high water resistance renders this plasticizer particularly valuable for various types of films, cast or extruded.
Also recommended for any product in which low volatility is of especial importance.

For further information please inquire of Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y.; 444 West Grand Ave., Chicago 10, Illinois; 605 Third Street, San Francisco 7, Calif.

PFIZER QUALITY

PFIZER
Manufacturing Chemists Since 1849

5285

MORE NEW ORGANIC CHEMICALS NOW AVAILABLE

In Research Quantities

PRODUCTS	°C	UNIT OF SALE
iso-Phthalic Acid C_6H_4-1, 3-$(COOH)_2$	M.P. 339-343	100 g.
tere-Phthalic Acid C_6H_4-1, 4-$(COOH)_2$		10 g.
ortho-Toluic Acid $CH_3C_6H_4COOH$	M.P. 104-105	100 g.
meta-Toluic Acid $CH_3C_6H_4COOH$	M.P. 109-112	100 g.
para-Toluic Acid $CH_3C_6H_4COOH$	M.P. 178-180	100 g.
ortho-Ethoxyphenol $2\text{-}C_2H_5OC_6H_4\text{-}1\text{-}OH$	M.P. 27-28	500 g.
para-Cyanobenzonitrile CNC_6H_4COOH	M.P. 213-214	10 g.
para-Chlorobenzonitrile ClC_6H_4CN	M.P. 91-92	100 g.
meta-Nitrobenzonitrile $NO_2C_6H_4CN$	M.P. 115-116	10 g.
para-Nitrobenzonitrile $NO_2C_6H_4CN$	M.P. 145-146	10 g
alpha-Naphthonitrile $C_{10}H_7CN$	M.P. 31-32	10 g.
Propionitrile (Pract.) CH_3CH_2CN	B.P. 96-97	500 g.
n-Butyronitrile $CH_3(CH_2)_2CN$	B.P. 117-119	100 g.
n-Capronitrile $CH_3(CH_2)_4CN$	B.P. 161-164	100 g.
ortho-Tolunitrile $CH_3C_6H_4CN$	B.P. 93-94/18 mm	100 g
meta-Tolunitrile $CH_3C_6H_4CN$	B.P. 89-90/11 mm	100 g.
para-Tolunitrile $CH_3C_6H_4CN$	M.P. 25-27	100 g.
Benzonitrile C_6H_5CN	B.P. 188-189	100 g.
meta-Nitrobenzonitrile $NO_2C_6H_4CN$	M.P. 115-116	10 g.
meta-Nitrophenol $NO_2C_6H_4OH$	M.P. 96-97	100 g.
para-Aminobenzoic Acid $NH_2C_6H_4COOH$	M.P. 187-188	500 g.
Methyl-p-Toluenesulfonate $CH_3C_6H_4SO_2O\text{-}CH_3$	M.P. 27-28	1 Kg.
n-Capryl Aldehyde $CH_3(CH_2)_6CHO$	B.P. 167-172	100 g.
n-Valeraldehyde $CH_3(CH_2)_3CHO$	B.P. 102.5-104.5	100 g.
iso-Valeraldehyde $(CH_3)_2CHCH_2CHO$	B.P. 91.5-93.5	100 g.

NEW ORGANIC CHEMICALS

A number of organic compounds heretofore unavailable except in the most limited quantities are in research or pilot plant scale production. Inquiries invited.

GENESEE RESEARCH CORPORATION
572 Lyell Avenue
Rochester 6, N. Y.

EMCOL 3180

Complex higher alcohol sodium sulfate; soapless detergent to be used for formulation of paste shampoo; 50% total solids, 30% active ingredient, white paste, pH (1%) about 8. Surface tension (0.1%) 30 dynes/cm. The Emulsol Corp.

EMCOL 4150

Complex fatty acid derivative of aliphatic sulfonate. Excellent detergent for cosmetic, textile and industrial application. Dilutions with water remain clear without filtration. Color, amber liquid. Total solids 40%; active ingredient 35%. pH (0.1%) about 6. Surface tension (0.1%) 35 dynes/cm. The Emulsol Corp.

EMCOL 5100

Alkanolamine fatty acid condensate; nonionic detergent for textile use, industrial cleaners, household cleaners, etc. 90% active; 10% moisture. Color, straw. Odor, pleasant. Liquid congealing around 0°; pH (1%) about 9; surface tension (0.1%) 32 dynes/cm. Effective over a wide pH range; compatible with anion-active and cation-active detergents. Forms viscous solutions when diluted with water. The Emulsol Corp.

EMCOL H-47

Anhydrous soapless mixture of higher fatty acid complexes of various polyhydric alcohols; emulsifier for preparation of insecticidal emulsion concentrates especially with aromatic solvents which dissolve DDT. Makes chlorinated solvents, aromatic solvents, turpentine, etc., spontaneously emulsifiable. Effective at 5% concentrations, pH range 4-10. The Emulsol Corp.

EMCOL H-50-A

Anhydrous soapless mixture of higher fatty acid complexes of various polyhydric alcohols; suitable as emulsifying agent for aliphatic type solvents such as kerosene, naphtha, mineral oil, etc. 4% sufficient to make "soluble" kerosene. Color: amber liquid. Effective pH range 4 — 10. Soluble in chlorinated solvents, benzene, turpentine, kerosene, Stoddard solvent, etc. The Emulsol Corp.

EMCOL RDC-D

Diethylene glycol laurate; self-emulsifying. Useful emulsifying agent in cosmetic, metal working, resin, textile emulsions. Color: light amber liquid. Surface tension (0.1%) 31 dynes/cm. pH (1%) 8.8. Dispersible in water and oils; soluble in alcohols and benzene. The Emulsol Corp.

EMCOL RH

Self-emulsifying mono and diglyceride of special blend of fatty acids; emulsifier for food and pharmaceutical products. Cream colored solid. pH 1% dispersion about 9. Solidification point about 57°C. The Emulsol Corp.

EMERY'S A509R CATIONIC COMPOUND

A quaternary ammonium salt derived from a long-chain fatty acid (25% in water solution). Appearance, clear liquid; odor, sweet; color, light amber. Properties, (cationic surface active compound) substantive in solution to cellulosic materials, resistant in a pH range of 3 — 9, and to hard water, compatible with sulfates, phosphates, non-ionic materials. Uses: as textile softener, emulsifying agent, deflocculating agent, acid detergent, dye fixative, mordant. Available in drum quantities. Emery Industries, Inc.

EMERY'S 0464R LOW-LINOLEIC OLEIC ACID

Typical formula $C_{18}H_{33}COOH$. Mol. Wt., 282. IV 83. Free Fatty Acid 97% as oleic. Linoleic Acid 0.50%. Titer 15°C. Appearance, mobile liquid; odor, very slight. Color, water white. Stability towards oxidation, passes 8 hour Mackey test. Chemical properties, the first commercially "pure" oleic acid free from polyunsaturated acids, forms esters, soaps, emulsifying agents, etc. of exceptional odor and color stability; a difunctional base material with a reactive double-bond and carboxyl group. Uses: wherever color, odor, and oxidation stability is important in present uses of oleic acid, as an intermediate for synthetic materials, where saturated acids only have been employed on account of stability; this oleic acid should be tested on account of its radically different properties. Available in drum quantities, tank cars available in first quarter 1948. Emery Industries, Inc.

EMULGOR A

Non-Ionic emulsifier and surface active agent. Uses: Dispersing agent for wettable DDT powders; preparation of stable emulsions in the presence of acids and salts. Tan, soft, solid; M.P., 44-53°C; pH 5% aqueous dispersion approx. 3; dispersible in water; soluble in alcohols and hydrocarbons. Glyco Products Co.

EMULSION 63

A bluish-white emulsion developed for use in extending carnauba wax water emulsions. Completely compatible with wax emulsions, it may be used to replace 25-40% of wax solids in emulsions, and also to replace gums and resins now employed to extend carnauba wax. Since Emulsion 63 contains 40% solids, it may also be used to increase solids of wax emulsions. In floor wax emulsions, it is recommended to improve gloss, water resistance, hardness, wearability, spread and leveling. Sp. Gr. 1.03; surface tension 45-47 dynes/cm.; pH 10. Advance Solvents & Chemical Corp.

ERUSTO FILTER SOAP

An amber colored, free flowing fluid dry cleaning soap for use in petroleum solvent plants equipped with filter and still, or filter only. This product eliminates the needs of a break operation, increases production; and turns out garments fresh, clean and free from odor. Erusto Filter Soap removes ground in soil as well as many water soluble type stains. It effectively holds loosened soil in suspension, prevents redeposition and results in unusually high whiteness retention and reduced spotting. This product has a Flash Pt. (Tag.-open cup) of 165°F. minimum. It weighs 6.78 pounds/gallons at 70°F and has a coefficient of expansion of 0.0008 cc/°C. This product is available in five gallon cans and 55 gallon drums. Pennsylvania Salt Manufacturing Co.

EXPERIMENTAL FLY REPELLENT No. 1

A polyalkylene glycol derivative. Compatible with oil carriers used for fly sprays; soluble in acetone, ethanol, and Freon F-12. Protects cattle from severe attack by stable flies, Stomoxys Calcitrans, and horn flies, Muscina Spp. Tests on horses indicate it will repel the horse fly, Tabanus. Undiluted, applied to face and arms of humans, it prevents biting of black flies, Prosimulium Hirtipes, and Simulium Venustum. V.P., less than 0.01 mm. Flash pt., approx. 420°F. Sp. Gr., 0.990 at 20/20°C. Available in commercial quantities. Carbide and Carbon Chemicals Corp.

EXPERIMENTAL FUNGICIDE 531

A calcium zinc copper cadmium chromate of low water solubility, can be formulated either as a spray or as a dust. Particularly effective for treatment and control of grass diseases. Particle size, 90% under 1 micron. Available in experimental quantities. Carbide and Carbon Chemicals Corp.

EXPERIMENTAL FUNGICIDE 974

A sulfur-containing organic compound of little odor. Suggested for preventing mold growth in water solutions of cellulose, starch, and natural gums susceptible to fungal attack; mildewproofing plywood and plywood adhesives, digested wood pulp, and other mold-susceptible materials not intended for human consumption. White crystalline solid. M.P., 105° to 107°C. Very slightly soluble in water. Soluble in acetone and dioxane. Available in experimental quantities. Carbide and Carbon Chemicals Corp.

FLEX-B

An unsaturated, non-volatile, hydrocarbon derivative suitable as a plasticizer for natural and synthetic rubbers and for the resins used in baking enamels, japan enamels and insulation varnishes. Iodine no., 100-125; color, dark brown; viscosity (Gardner-Holt), Z-4 to Z-6. Sp. Gr., 1.03-1.04; non-flammable. Amecco Chemicals, Inc.

"FLEXOL" PLASTICIZER B-400

Sp. Gr., 01995 at 20/20°C. R.I., 1.4487 at 20°C., n_D. V.P., 0.11 mm at 150°C. Flash Pt. (open cup), 430°F. Viscosity, 200 cps. at 20°C. Coef. of expansion, 0.00075 at 20°C. A clear, light-colored liquid. Compatible with nitro-cellulose, forming tough films with excellent gloss and high elongation. Resembles castor oil in its softening action. Differs from ester plasticizers in that its low solvent power does not seriously weaken film strength. Available in commercial quantities. Carbide and Carbon Chemicals Corp.

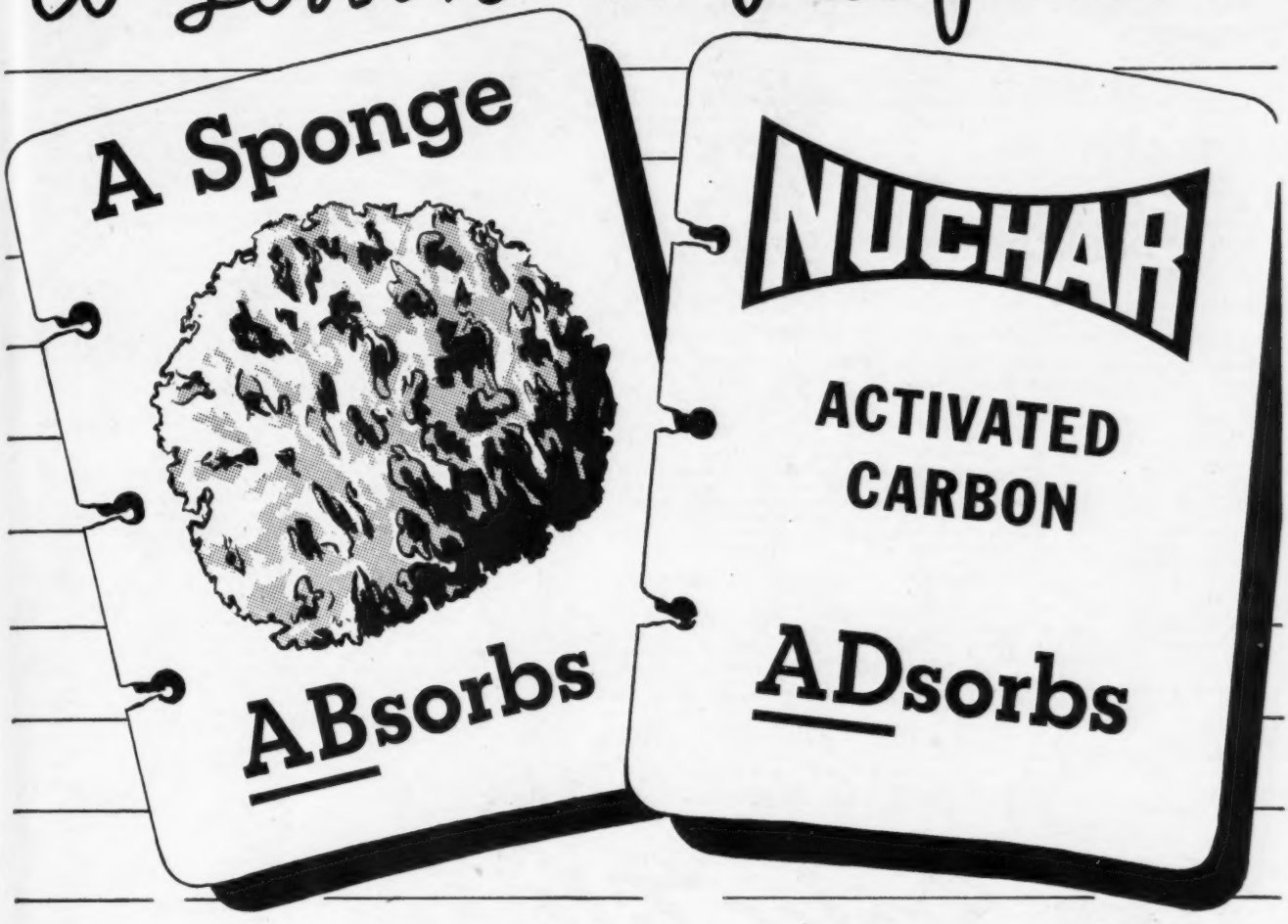
FLEXTENDER 3-A

A sulfurized petroleum oil derivative comparable to vegetable oil factices and applicable as an extender and processing aid for natural and synthetic rubbers and the vinyl copolymers. It imparts superior physical properties and good aging characteristics. It is adaptable for extruded products, flooring compositions and midsoling compounds. Amecco Chemials, Inc.

FORMASET A

A synthetic resinous "clear" which is used as an emulsifying agent and binder in water-in-oil type pigment printing emulsions. Warwick Chemical Co.

A Lesson in Purification



The similarity between the words "adsorption" and "absorption" frequently causes confusion as to their difference. The distinction can best be shown by comparing the two reactions in the dyeing process.

If some dye is dissolved in a jar of water, and a non-dyeable sponge is placed in the solution, it will soak up (*ab*sorb) part of the solution, but when the sponge is removed, the liquid remaining in the jar has the same depth of color as before. The net result is just as though some of the liquid had been poured out of the jar.

If, instead of the sponge, a piece of woolen cloth is used, part of the dye leaves the water and forms a concentrated film or layer on the surface of the wool. The dye is *ad*sorbed, colors the cloth, and when the cloth is removed from the solution the liquid remaining in the jar has less color than before. All of the color can be removed by repeating this process using additional pieces of cloth.

Activated Carbon is the one material that possesses outstanding *ad*sorptive power. Nuchar Activated Carbon, because of its tremendous surface area and adsorptive qualities, has found wide acceptance in purification processes of American industry. Nuchar removes by adsorption colors, tastes and odors from such products as chemicals, drugs, pharmaceuticals, biologicals, dye intermediates, food products, industrial water, off-grade products, oils, fats, and waxes. Anyone interested in a detailed report of the uses of Nuchar Activated Carbon in purification by adsorption should fill out the coupon below for our booklet "Nuchar Active Carbon—purification by adsorption."

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FORMASET MHP

This is a 100% active urea-formaldehyde condensate which is used for creaseproofing and shrinkproofing rayon and cotton fabrics. It is sold as a white granular powder and is specially processed to render it readily soluble. Warwick Chemical Co.

FORMASET SR

A new type of urea-free, thermosetting resin that produces shrinkproof and creaseproof finishes on rayon which are not chlorine retentive. Warwick Chemical Co.

G-930

An oleic acid derivative of a polyhydric alcohol. Is an unusually efficient W/O emulsifier. May be used in cosmetic and pharmaceutical emulsions currently employing absorption bases, or other W/O emulsifiers, without major alteration to the formula. Light lemon colored fluid. Atlas Powder Co.

G-931

An oleate type of derivative that is a good W/O emulsifier. G-931 is intended for the competitive market. Suggested for use in cosmetics and pharmaceuticals. Atlas Powder Co.

G-1096

An oleic acid derivative of polyoxyethylene sorbitol. This material is an unusual O/W emulsifier. It finds the greatest use in the formation of emulsifiable insecticide concentrates containing DDT or benzene hexachloride in hydrocarbon solvent. Is an orange-yellow fluid, soluble in organic solvents usually used with the above insecticides. Atlas Powder Co.

G-1425

A lanolin derivative so modified that it is easily dispersible in warm water. It may be used in cosmetic and pharmaceutical preparations in several ways: As a means of easily incorporating lanolin in emulsified formulas of the O/W type without altering the emulsification completely; as a basis of O/W lanolin derivative emulsions, and as an O/W type emulsifier, particularly in combination with lanolin and G-1431, G-1441, G-1451, and related materials. Appearance and feel are similar to lanolin. Atlas Powder Co.

G-1431

A lanolin derivative so modified that it is practically soluble in water. Used in cosmetic and pharmaceutical preparations in several ways: As a means of easily incorporating lanolin in emulsified formulas of the O/W type without altering the emulsification completely; as a basis of O/W lanolin derivative emulsions, and as an O/W emulsifier, particularly in combination with lanolin, G-1425, G-1441, and related materials. Appearance and feel are similar to lanolin. Atlas Powder Co.

G-1441

A lanolin derivative so modified that it is soluble in water. Aqueous solutions are prepared by dissolving in warm water. Permits the incorporation of a lanolin derivative in clear cosmetic or pharmaceutical preparations. Is used alone for these applications. May be used in conjunction with lanolin, G-1425, G-1431, and related materials as an emulsifier of the O/W type. Appearance and feel similar to lanolin. Atlas Powder Co.

G-1451

A lanolin derivative so modified that it is soluble in water. Aqueous solutions are prepared by dissolving in warm water. Permits the incorporation of a lanolin derivative in clear cosmetic or pharmaceutical preparations. Is used alone for these applications. May be used in conjunction with lanolin, G-1425, G-1431, and related materials as an emulsifier of the O/W type. Appearance and feel similar to lanolin. Atlas Powder Co.

G-1493

A lanolin derivative so modified that it is soluble in mineral oil without the formation of the haze that is usually obtained with lanolin. Solution is best achieved by warming the oil and the G-1493 together. The solution is stable at temperatures as low as 0° F. Permits the formulation of clear oil-lanolin derivative preparations. Is used alone for these applications. May be used as an emulsifier alone or in conjunction with lanolin and/or water dispersible and water soluble lanolin derivatives. Appearance and feel similar to lanolin. Atlas Powder Co.

G-1584

A lecithin derivative so modified that it is soluble in water. Suggested as an emulsifier alone or in combination with lecithin. Color similar to lecithin, much more fluid than lecithin. Atlas Powder Co.

GLOSS VARNISH PAPER COATING 607-4F

Clear, stable, resin solution which has good adhesion, flexibility, tear and wet strength, resistant to water, most acids, petroleum solvents, posesses good scuff and abrasion resistance, etc. May also be used as shellac modifier and alternate. American Resinous Chemicals Corp.

GOOD-RITE FRUIT THINNER

A complex of Good-rite polyethylene polysulfide and zinc dimethyl dithiocarbamate and cyclohexylamine will serve as an excellent fruit thinning spray, eliminating the necessity of hand labor to remove excessive, undesirable fruit before harvest. Control tests on apple trees using this new spray mixture applied two weeks after full bloom show that the number of apples per tree have been reduced up to 50%. Further, it is non-injurious and non-caustic to both fruit and tree. By its thinning action, larger and more healthy fruits result. B. F. Goodrich Chemical Co.

GRIPTEX RUG BACKING

Griptex, a new liquid rubber-lastic compound, makes rugs sprout-proof, fray-proof and skid-proof. Griptex can be applied to backs of rugs by brush, spray-gun, roller or doctor-blade. It forms a strong flexible film which anchors each individual tuft and prevents the pile from pulling out. Its skid-proof qualities prevent rugs from sliding on polished floors. Large Griptex-treated rugs can be cut without fraying and the Griptex coating gives rugs additional weight, body and firmness, yet remains permanently flexible. Griptex is waterproof and can withstand washing, thus making it a permanent part of a rug. It dries tack-free, has great tensile strength and tolerates high temperatures. It is already being used on hooked rugs, axminsters, broadlooms, cotton-tufted and wool-tufted rugs. Available in quarts, gallons and five gallon cans as well as in 55 gallon drums. Adhesive Products Corp.

The Scales Tilt to Fulton

WATERPROOF BAGS

FOR SHIPPING CHEMICALS, CHEMICAL COMPOUNDS & POWDERED MATERIALS

FULTON WATER PROOF BAGS tip the scales with:

ECONOMY
lower cost per package.

SAFETY
moisture-proof and sift-proof Fulton Water Proof Bags provide safe handling for chemicals or any product where seepage, dusting, or absorbtion is a consideration.

FLEXIBILITY
adaptable to many products Fulton Water Proof Bags are easily handled, packed, and stored. Light but tough.

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Fulton Artcraft Printing displays your name and brand to advantage — a plus advertising value.

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FALL . . . . . WINTER

Each season has its special needs which GATX tank cars supply. Now there is a seasonal movement of products like asphalt and road oils. Later in the year, and in different localities, crude vegetable oils, blackstrap, beet and cane molasses will go to market—the GATX tank car way.

When winter comes these cars will haul burning oils, fuel and such commodities—thus keeping pace, throughout the year with shippers' needs that depend on "Time and Place."

Routing tank cars by season—changing them from one commodity to another—from one part of the country to another—is part of General American's work for railroads and shippers. A basic service of the GATX fleet of more than 37,000 specialized tank cars of 207 types.

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GATX
GENERAL AMERICAN

HEAT SEAL COATING FOR CLOTH 366-21B

Water-white, transparent, high viscosity solution. Application by knife or roller. Possesses excellent adhesion to fabrics. Resistant to water, dilute caustic solutions, and boiling soap water. Heat seal temperature 250°F. Used for cloth tapes. American Resinous Chemicals Corp.

HEXOGEN DRIERS

Metallic driers of the highest quality and uniformity, based on a new 8 carbon atom, saturated organic acid. The driers in this series are Hexogen Lead 24%, Hexogen Cobalt 6%, Hexogen Manganese 6%, Hexogen Zinc 8%, and Hexogen Calcium 4%. Advantages are lack of odor, high metallic content, good storage stability, good compatibility with protective coating vehicles, excellent color and minimum staining effect. This type of drier also seems to have a more active catalytic effect on the oil film, hence produces a faster drying film with equal amount of metal drier. Advance Solvents & Chemical Corp.

HIBITITE L

$C_{27}H_{48}NO_{10}S_2$. Brown liquid. Mol. Wt., 607. B.P., 1.2% wt. loss at 200°/5 mm. Sp. Gr., 1.16 at 15°C./15°C. R.I. 20°, 1.5275. Assay, 95% (minimum). Limited solubility in dilute mineral acids, and diethyl ether. Soluble in ethanol, acetone, dioxane, benzene, $CHCl_3$, and CCl_4. Insoluble in H_2O and petroleum ether. Uses: Metal pickling inhibitor. Availability: Pilot plant quantities. Monsanto Chemical Co.

HOT MELT 605-4

A mixture of 25% rubber and 75% microcrystalline wax, tough and flexible. Sold as a concentrate to add to microcrystalline waxes to increase adhesion and flexibility particularly for lamination. American Resinous Chemicals Corp.

HOT MELT 683-10

A vistanex-paraffin concentrate recommended for increasing the viscosity of paraffin wax in paper or boxboard stock coatings. Outstanding advantages are decreased penetration, improved adhesion, higher moisture vapor resistance and increased flexibility at low temperatures. American Resinous Chemicals Corp.

HYDRAMINE RESIN 4184D

A resin solution containing approx. 50% solids. Color, less than 1 Hellige. Acidity, approx. 19.5 cc. 0.1N HCl per 10.0 cc. resin solution. Odor, faint formaldehyde. No turbidity. Films, very tacky. Use: As a Nylon size to prevent broken ends during weaving. Available in commercial quantities. Sharples Chemicals Inc.

ISO CYCLO CITRAL—S

An aromatic specialty with a perfectly natural green note, devoid of all chemical by-odors, leafy with a slight earthy undertone. Powerful but very smooth upon dilution. A pale yellow to colorless liquid that is easily soluble in alcohol as well as in all essential oils. Iso cyclo citral S is ideally suited to bring a floral bouquet to life, having that elusive last touch of "nature." Stable in perfumes, colognes and cosmetics. Moderately stable in soaps. Uses: Masking agent for indoor sprays and household deodorants, and in perfumes, cosmetics and soaps. The Dow Chemical Co.

JCX VINYL STABILIZER

A vinyl resin light stabilizer consisting of approx. 50% active ingredients dissolved in 50% by weight of solvent type, non-volatile plasticizer for the polyvinyl chloride resins. In modest dosages, produces excellent resistance to sunlight, and good resistance to heat. Compatibility excellent, yielding clear films and masses with common copolymer vinyl resins and with straight vinyl chloride products. Useful in vinyl lacquers or solutions, vinyl plastic masses, and in vinyl resins mixed by the Hungerford Process. Viscosity (Gardner scale) G to H; Color (Gardner-Holdt) 5; Sp. Gr., 1.083. Advance Solvents & Chemical Corp.

KAM

A bottle-washing compound designed for dairy and beverage plants which are served by a water supply which is of normal hardness or soft. The product consists of white flakes. Available in 100 lb. and 400 lb. steel drums. Westvaco Chlorine Products Corp.

KELCOLOID

An algin product for use as an emulsifier, thickener, stabilizer and suspending agent in aqueous media below pH7. Completely soluble in water to give clear, tasteless and odorless solutions. Suitable for food, pharmaceutical, cosmetic and industrial uses such as in french dressings, salad dressings, pie fillings, flavor emulsions, fountain syrups, mineral oil emulsions, tooth paste, lubricating jellies, lotions, adhesives, polishes, acid cleaners, etc. Available in commercial quantities in both high viscosity and low viscosity grades. Kelco Co.

KOSMOS 50—DIXIE 50

A carbon black, dustless (pelleted), from incomplete combustion of oil-enriched natural gas by the furnace process (United); used as HMF (high modulus furnace) type for reinforcement of natural and all types of synthetic rubbers for passenger and truck tires and tubes, industrial and truck solid tires, farm tractors and implement tires and tubes, camelback, soles, heels, belting, wire and cable; in natural rubber and GR-S the black is characterized by easy processing, fast extrusion, with dense smooth appearance especially in GR-S, low shrinkage, fast rate of cure, high modulus, high tensile, high resiliency, moderate heat generation, good aging, and high resistance to abrasion, cut-growth, and flexing; particle configuration indicates reticular structure, compact clusters, and multiple branching; average particle diam., 93mu; surface area, 34.5 m^2 per gram; pH, 8.9; volatile matter (7 min. at 950°C.), 1.8% max.; Sp. Gr., 1.80; bulk, 23-28 lbs./$ft.^3$; moisture, 1.0% max.; ash, 0.5% max.; residue (325 mesh screen, 0.44 mm opening), 0.1% max.; resistance, 1.0 ohm; oil absorption, 170 cc./100 grams black; iodine adsorption, 3.8%; extract (benzol), 0.1% max.; soft texture, impalpable powder; color (lithographic #1 varnish) by nigrometer, 99.1; tint (100:1 with lithographic #1 varnish, grayest black considered as 100), 286. United Carbon Co.

KOSMOS 60—DIXIE 60

A carbon black, dustless (pelleted), from incomplete combustion of oil-enriched natural gas by the furnace process (United); used as RF (reinforcing furnace) type for the reinforcement of natural rubber and GR-S or passenger and truck tire treads, farm tractors and implement tire treads, camelback, soles, heels, belting wire and cable; in printing and engraving inks for fullness of printing resulting in opaque, dull, dead, mat finish, and for brownish undertone; in natural rubber and GR-S the black is charac-

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terized by low accelerator requirement, hot mixing, easy processing, fast extrusion, with dense smooth appearance especially in GR-S, low shrinkage, fast rate of cure, very high modulus, high tensile, high resiliency, moderate heat generation, good aging, and high resistance to abrasion, cut-growth, and flexing; particle configuration indicates reticular structure, compact clusters, and multiple branching; average particle diam., 38 mu; surface area, 81.4 m^2/gram; pH, 8.8; volatile matter (7 min. at 950°C.), 1.5% max.; Sp. Gr., 1.80; bulk, 23-28 lbs./ft^3; moisture, 1.0% max.; ash, 0.5% max.; residue (325 mesh screen, 0.44 mm opening), 0.1% max.; resistance, 1.1 ohms; oil absorption, 187 cc./100 grams black; iodine adsorption, 13.2%; extract (benzol), 0.1% max.; soft texture, impalpable powder; color (lithographic #1 varnish) by nigrometer, 90.7; tint (100:1 with lithographic #1 varnish, grayest black considered as 100), 347. United Carbon Co.

LABELS-TO-ALUMINUM CEMENT

A very efficient cement for holding labels to highly polished surfaces such as aluminum-ware, stainless steel and chromium plated products. Will not stain, smear or mar surface of metal. Can be easily removed with warm water. Available in gallon cans, five gallon cans and 55 gallon drums. Adhesive Products Corp.

LAMINANT 607-31B

A series of solvent type laminants for bonding plastic film and metal foil to paper. Water resistant, light stable, non-discoloring on ageing, transparent. American Resinous Chemicals Corp.

LATEX TACKIFIER 700-25A

Emulsion derived from a modified alkyd resin solids material which combined with natural latex produces a medium viscosity adhesive for use in bonding leather, paper and cloth. Formulated adhesives possess excellent weld and produces strong pressure sensitive adhesives which retain tack for several days. Excellent base for compounding shoe adhesives. Particularly useful where the natural latex is inferior in quality. American Resinous Chemicals Corp.

LAXAN

A bottle-washing compound designed especially for dairies and beverage plants where only hard water is available. The product is a mixture of small white flakes and powder. Available in 125 lb. and 400 lb. steel drums. Westvaco Chlorine Products Corp.

LEXONE INSECTICIDE COMPOSITION 50

Lexone 50 is an insecticide composition containing 50% symmetrical hexachlorocyclohexane (Benzene hexachloride). The 50% active ingredient is composed of 6% gamma isomer and 44% other isomers of hexachlorocyclohexane. Lexone 50 is a gray powder designed for use either as a spray or dust. It goes into suspension readily in water or mixes evenly with diluents for dust applications. It has a persistent musty odor. E. I. du Pont de Nemours & Co.

LIQUID MILKSTONE REMOVER

A brown liquid specifically compounded for the effective removal of milkstone deposits in dairy plants. Available in cases of 4-1 gallon jugs and 12 gallon carboys. Westvaco Chlorine Products Corp.

LUPERCO BTC

$(p\text{-}ClC_6H_4CO)_2O_2$. Mol. Wt., 311.12. 50% p-Chlorobenzoyl Peroxide in Tricresyl Phosphate. Active Oxygen, 2.5% (min.). A heavy white paste containing p-chlorobenzoyl peroxide compounded with tricresyl phosphate. Insoluble in water, soluble in common organic solvents. Suggested for use as a polymerization catalyst at temperatures slightly higher than those used for benzoyl peroxide. Available in pilot plant quantities, samples on request. Lucidol Division, Novadel-Agene Corp.

LUPERCO CDB

$(Cl_2C_6H_3CO)_2O_2$. Mol. Wt., 345.58. 50% 2,4-Dichlorobenzoyl Peroxide in Dibutyl Phthalate. Active Oxygen, 2.1% (min.). A highly active organic peroxide compounded with dibutyl phthalate as a heavy white paste. Insoluble in water, very soluble in organic solvents and monomers. Suggested for use as a low temperature polymerization catalyst. Available in limited quantities, samples on request. Lucidol Division, Novadel-Agene Corp.

LUPERSOL DDM

$(CH_3CO_2C_2H_5)x$. Mol. Wt., (88.04)x. 60% Methyl Ethyl Ketone Peroxide in Dimethyl Phthalate. Active Oxygen, 11.0% (min.). A clear, colorless, non-volatile solution. Insensitive to shock. Inflammable liquid thermally stable at 75°C. Insoluble in water, slightly soluble in petroleum solvents, soluble in oxygenated organic solvents. Suggested for use as a high temperature polymerization catalyst. Available in pilot plant quantities, samples on request. Lucidol Division, Novadel-Agene Corp.

LUSTREX

Heat resistant polystyrene. Injection molding temp., 350°-620°F. Molding pressure p.s.i. 10,000 and up. Sp. Gr., 1.05. Flexural strength, p.s.i. 12,000-14,000. Flexural deflection, inches, 0.15-0.25. Impact strength, ft. lbs./inch (unnotched) 3.2-3.6. Heat distortion temp. °C. (Air bath) 87-88½. Dielectric constant, 1 megacycle, 2.5-2.7. Power factor, 1 megacycle, 0.0001-0.0005. Water absorption, % (24 hrs) 0.04-0.05. Chemical resistance, no effect from weak acids and bases or strong bases. Strong oxidizing acids attack. Soluble in esters, aromatics, higher alcohols, chlorinated hydrocarbons. Color possibilities, also unlimited. Usually can be molded in cycles up to 30% faster than that required for ordinary polystyrene. Uses: Opens up an entirely new group of uses for plastics, permitting them to be immersed in boiling water. Availability: Commercial quantities. Monsanto Chemical Co.

"MARLATE" 50

"Marlate-50" is an insecticide composition containing 50% methoxyclelar (Bis(methoxyphenyl) trichloroethane). It is particularly useful on such crops or under such circumstances where DDT is injurious to the plants; presents undesirable residue hazards; or for the control of the Mexican bean-beetle against which DDT is not effective. E. I. du Pont de Nemours & Co.

MERCK ENRICHMENT PRODUCTS

In accordance with latest nutritional advances, the Merck line of products for the enrichment of bread and flour has been expanded to include new mixtures as follows: Merck Vitamin Mixture for degerminated corn meal enrichment; Merck Vitamin Mixture for whole corn meal; Merck Vitamin Mixture for degerminated corn grits; and Merck Vitamin Mixture for the enrichment of macaroni, spaghetti, noodles, pastina, etc. The vitamin potency of each product is specifically formulated to facilitate enrichment in conformity with the official standards for the food to be fortified. Merck & Co., Inc.

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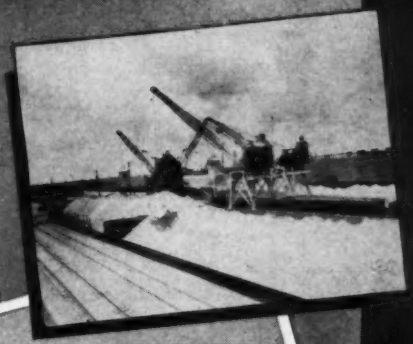

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MERTONE WB-2

A milky white silica aquasol (15% SiO_2), pH 9.0-9.5, especially designed for use as a precoat on paper to be subsequently coated with light-sensitive solutions. The precoat increases brilliancy and depth of color after development, and reduces wastage due to overexposure. Availability: Commercial quantities. Monsanto Chemical Co.

MILK-CAN WASHING POWDER

A detergent mixture specifically designed for washing milk cans in dairies and on farms. Consists of a dry white free-flowing powder. Available in 100 lb. and 300 lb. fiber drums. Westvaco Chlorine Products Corp.

MORLAC

A new all-purpose cleaner designed primarily for use in dairies but also useful in many other industries, particularly food plants, for general cleaning in and around the premises. The product is a dry, white, free-flowing powder. Available in cases of 4-15 lb. fiber drums, 100 lb. fiber drums, 300 lb. fiber drums. Westvaco Chlorine Products Corp.

N-1540

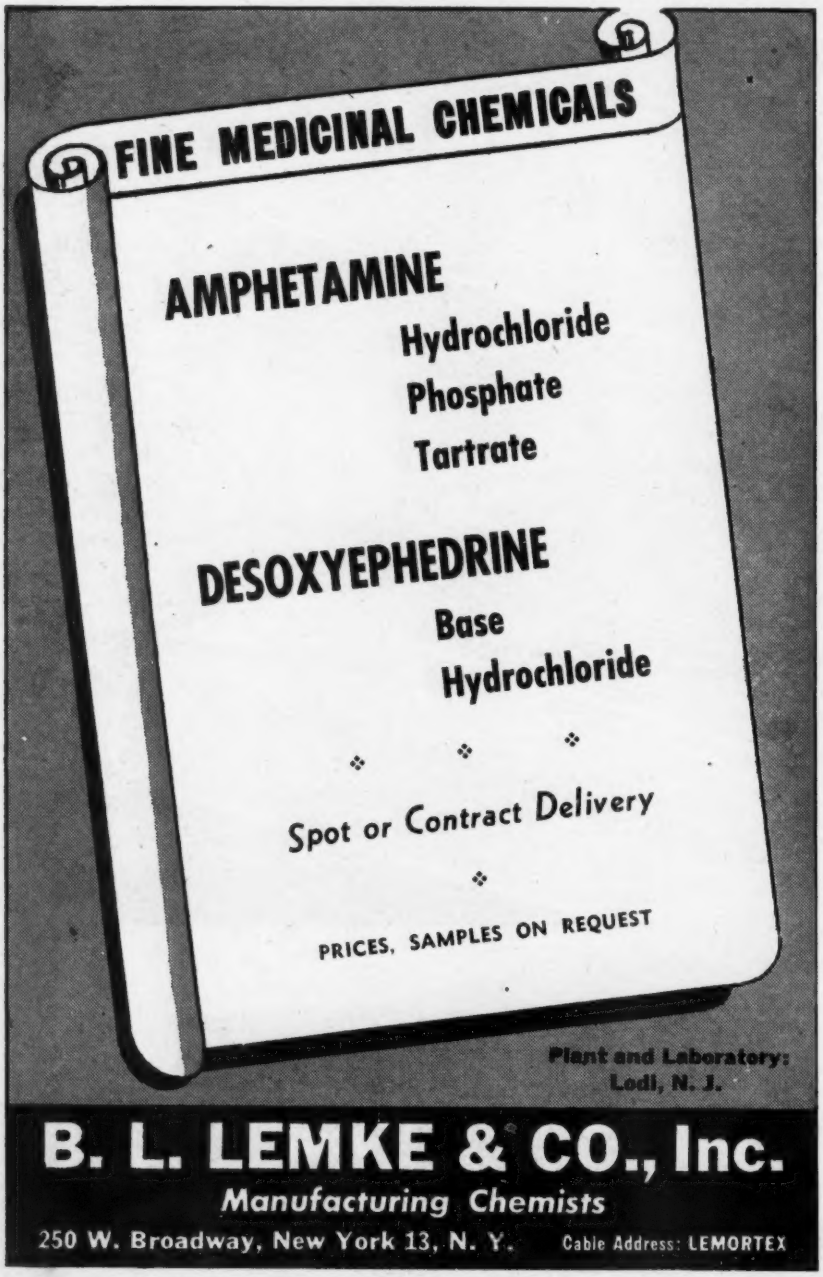
$C_{27}H_{32}O_2N_4S_6$. Mol. Wt., 627. Melt. range, 223-227°C. Sp. Gr., 1.46. Cream colored powder. Assay, not less than 95%. Very slightly soluble or insoluble: ethyl alcohol, butyl alcohol, ethyl acetate, acetone, chloroform, carbon tetrachloride, carbon bisulfide, benzene, toluene, ether, and naphtha. Soluble in hot chlorobenzene and o-dichlorobenzene. Uses: Rubber accelerator. Availability: In pilot plant quantities. Monsanto Chemical Co.

N-3411

$C_{19}H_{21}NO$. Gray powder. Mol. Wt., 279. M. P., 124°C. Sp. Gr., 1.133. Assay, 98%. Soluble in acetone, benzene, toluene. Uses: Anti-oxidant for GR-S Latex. Availability: Pilot plant quantities. Monsanto Chemical Co.

NEUTRONYX 834

Fatty acid ester of a polyether alcohol. Amber colored oily liquid. Dispersible in water, soluble in common organic solvents and in mineral oil. Non-ionic surface-active emulsifying agent, particularly suitable for the preparation of "oil-in-water" emulsions of mineral oil. Commercially available in anhydrous form. Onyx Oil & Chemical Co.



NYLON LAMINATING CEMENT

Adrub Cement was formulated to solve the difficult problem of laminating nylon. It results in a powerful bond between nylon and rubber or nylon and other materials. Adrub is also excellent for laminating fibre-glass. It can be applied easily by brush and is also available in viscosities for spreading applications. Adrub dries quickly and remains permanently flexible. Adhesive Products Corp.

OHOPEX W-4 PLASTICIZER

Sp. Gr. at 20°/20°C., 0.962±0.005; R. I. at 25°C., 1.440. Boiling range at 4 mm., 200-235°C. Solubility in water at 25°C., 0.3% by volume. Solubility of water in at 25°C., 3.4% by volume; Gasoline solubility, complete; Mineral oil solubility, complete; viscosity at 20°C., 12 cps.; Surface Tension at 20°C., 28.4 dynes/cm.; Flash Pt., 405°F.; Freezing Pt., —50°C. (turbid gel); Acidity, max. 0.2% as acetic acid; Moisture, max. 0.1%; Saponification No. approx. 150; Color, max. #500 Pt-Co.; Odor, mild. Ohopex W-4 is an excellent plasticizer for polyvinyl chloride, copolymers, butyral, and acetate; nitrocellulose, chlorinated rubber; ethyl cellulose; cellulose acetobutyrate; cellulose acetopropionate; and many other resins including the various synthetic rubbers. To these resins it imparts high tensile strength; low modulus; high elongation; flame retardance; permanent flexibility; excellent stability to ultra-violet light; low temperature flexibility; excellent hand and drape; and it is highly efficient. Ohio-Apex, Inc.

OPACO MAROON—11 T 26

This is a calcium lake of 1-sulpho-beta-naphthalene-azo-beta-naphthol. This is a product of the Lithol Maroon class of organic pigment, which has been specially developed to obtain high covering when dispersed in oleo-resinous vehicles. It is a bright, bluish-red pigment, which is suited for paints, printing inks, and other coatings where very high covering is desired. Sp. Gr., 1.60; 1 lb. bulks Gal., .07502; Oil Absorption 39.00. Ansbacher-Siegle Corp.

OROSET L

An anionic surface-active agent in liquid form. Active ingredient: Sodium salt of the sulfuric acid ester of a unique higher aliphatic alcohol. Recommended as a foaming agent, dyeing assistant, and all-round detergent. Availability: Production quantities. Onyx Oil & Chemical Co.

OVERGRIND 26

A new departure in the field of grinding. The requisite qualities of a superior grinding compound, including corrosion preventive action, have been incorporated in a solid compound, free from water, solvents, or diluent oils. Concentration: one pound of Overgrind 26 to 25 gallons of water. Bee Chemical Co.

PADDING ADHESIVE BASE 700-44

A low cost padding adhesive derived from a resin modified synthetic rubber latex designed for the adhesive manufacture to impart a strong non-blocking elastomeric film. Pads may be removed from the clamp 5 minutes after the adhesive is applied. Data on the addition of coloring agents will be supplied on request. Product can be packaged in glass, wood or metal without storage deterioration. Comes in brushing viscosity. Padding adhesives derived from polyvinyl acetate emulsions are also available. American Resinous Chemicals Corp.

PAISLEY FLATACK NON-WARP GLUE #3309 (Cake Form)

Flatack Glue #3309 describes a specially compounded cake form animal glue base adhesive. Color is clear yellow, which becomes transparent when reduced with water and applied on material. High initial strength and lingering tacky range is provided by incorporating plasticizing agents with the specially selected animal glue base. Recommended dilution with water is from 25% to 75% by weight. Correct running temp. is bet. 125°F. and 140°F. Outstanding feature of this adhesive is ability to melt down to a fluid body, which results in greater coverage per pound when applied by automatic gluing machines. Lay-flat qualities and non-warp features result from proper balance of plasticizing ingredients to keep excess moisture at the glue line where it cannot penetrate and warp the materials on which it is used. This product is suitable for paper, cardboard, coated fabrics, leather, felt, cork, and many other pourous materials. Its features make it suitable for paper box manufacturing, luggage manufacturing, lining display cases, laminating, bonding, and bindery operations. Available in cake form, weighing approximately 9 pounds each, prescored for easy separation and melting. Paisley Products Inc.

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PAISLEY FLEXTACK FLEXIBLE GLUE #3318 (Cake Form)

Flextack #3318 designates an improved cake form, animal base glue, which utilizes modern principles of animal glue manufacture. Complete flexibility under all climactic conditions is obtained by incorporating glycerin in a carefully balanced formula whereby this plasticizing agent does not detract from the quick tack and final strength of the animal glue employed in the formula. Supplied in cake form approximately 9 pounds each, the adhesive is reduced from 25% to 50% with water depending upon the porosity of the materials on which it is used. Running temp. is bet. 125°F. and 140°F. Color is pale yellow, and it is transparent on materials to which it is applied. Improved coverage and mileage per pound is obtained by its ability to run extremely fluid in machines or by hand brushing. A lonk tacky range is provided, allowing operators time to shape materials on which it is used. This product is of interest to luggage manufacturers, leather goods manufacturers, binderies, and other industries working with porous materials where flexibility is required. It is recommended for paper, cardboard, leather, coated fabrics, and similar materials. Paisley Products Inc.

PAISLEY ICESTIK BOTTLE LABEL GLUE #3643

Paisley Icestik #3643 is a scientific special animal glue conversion. Color is brown which becomes transparent when applied to bottles. High initial strength and lingering tacky range is provided by incorporating plasticizing agents with the animal glue base. Recommended dilution with water is about 10%. This product is used at room temp., approx. 70° to 90°. The outstanding feature of this adhesive is ability to stand long storage under conditions of high humidity and cold or heat. This product is especially suitable as a bottle labeling glue on bottles subject to storage in icewater. Its features make it suitable as a general bottle labeling adhesive where fast machines require immediate tack. Available in liquid form, weighing approximately 10 1/10 pounds to the gallon. Paisley Products Inc.

PAISLEY WOOD-GLU #2140

This glue is a cold run, fast setting thermo plastic resin emulsion which requires no heating and can be safely used winter and summer without worry about glue room temperature. Color is white which does not show on proper application to wood. High initial strength and lingering tacky range is provided by incorporating plasticizing agents with the selected resin base. Recommended dilution with water is dependent upon the moisture content of lumber. Correct running temp. is bet. 60° and 100°F. Outstanding feature of this adhesive is the ability to set after a clamping time of approximately 20 minutes. This product is suitable for wood gluing in the manufacture of furniture, especially where plywood is used. Its long working life of months makes it most acceptable as a general woodworking glue. Available in liquid form, weighing approximately 9 lbs./gallon. Paisley Products Inc.

PAPER IMPREGNANT 382-33

A resin modified nitrile tripolymer emulsion depositing a clear, tough, water-white, greaseproof film. Recommended for imparting ultra-stretch, tear and oil resistance, and also for use where good lacquer (nitrocellulose) adhesion is required. 33% solids. American Resinous Chemicals Corp.

"PARZATE" FUNGICIDE

"Parzate" is a fungicide composition containing 65% zinc ethylene bis dithiocarbamate, 15.4% of which is expressed as metallic zinc. It is a light yellow, fine particle powder, which stays in suspension well when used as a spray and mixes evenly with diluents for dust applications. It has excellent adhesive qualities and high fungicidal efficiency. E. I. du Pont de Nemours & Co.

PLASTIC PAINTS

Thermoplastic, non-oxidizing, synthetic resin coatings for wood, concrete, metal, glass and paper. Highly resistant to moisture, acids, alkalies and other corrosive chemicals. Can be used for continuous outdoor exposure. Advantages over oil paints include decreased drying time and toughness of deposited film. Formulated for both brush and spray viscosities. Available in all basic colors as well as unpigmented (clear). Special color shades can be matched in either dull or glossy finish. American Resinous Chemicals Corp.

PLASTISOLS

Solvent free dispersions of vinyl copolymer resins in pure plasticizer. Available in both clear and pigmented systems. Contains no volatile solvents thereby eliminating fire hazards. Recommended for paper and cloth coatings and also in the plastics molding industry for flexible extrusion work. Product possesses the combined advantages of toughness, flexibility and elasticity of rubber and the excellent aging and chemical resistance of vinyls. American Resinous Chemicals Corp.

PROTECTIVE COATING FOR BLUEPRINTS 311-30

A clear, water-white, flexible, greaseproof, non-tacky film, used to coat both new and old blueprints to offer protection from grease and the abuses of normal usage. Application by brush or spray. American Resinous Chemicals Corp.

PRINTING INK FOR VINYL FILMS

Available in various colors for both ordinary and silk screen printing. Has a ready flow of ink through silk screen. Does not dry-out on screen, dries within 15 minutes on vinyl sheet. Good opacity, non-powdering when dry, abrasion resistant, flexible. American Resinous Chemicals Corp.

PENCO BHC D-5

A light brown, extremely dustable, free flowing powder containing 5% of the gamma isomer of benzene hexachloride. This product is a finished agricultural insecticidal dust and present knowledge indicates it to be of value for the control of certain chewing and sucking insects such as: cotton boll weevil, cotton aphid, cotton fleahopper, cotton leafworm, cotton thrips, tarnished plant bugs, rapid plant bugs, Southern green stink bugs, garden webworm, fall army worm, cutworms, plum curculio, rice stink bug, cattle lice, cattle ticks, stable flies and bot flies. It may be used full strength or mixed with additional inert diluent, dependent on the application required. This product is available in 50 pound drums. Pennsylvania Salt Manufacturing Co.

PENCO BHC—DB-10

This product is a dust base, containing 10% of the gamma isomer of benzene hexachloride, and is primarily intended for use by insecticide manufacturers in the formulation of finished agricultural insecticide dusts. It is a light brown, dry powder reduced to fine particle size by special equipment, making it extremely dust-

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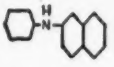
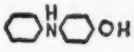
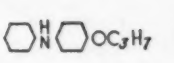
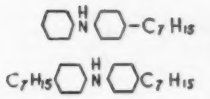
Secondary Aromatic Amines


Phenyl B-Naphthylamine


p-Hydroxy Diphenylamine

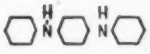

p-Isopropoxy Diphenylamine

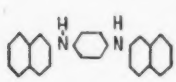

Mixed Mono and Diheptyl Diphenylamines

These amines are suggested for use as stabilizers, anti-oxidants, polymerization inhibitors, and for organic synthesis. It is believed that they will find wide usage in the following industries: Dyes, explosives, plastics, petroleum, photographic, drug, medicinal, and soap.

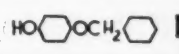
Other organic chemicals

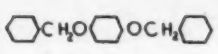
Di-secondary Aromatic Amines


Diphenyl p-Phenylenediamine

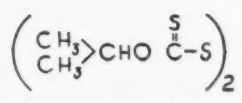

Di B-Naphthyl p-Phenylenediamine

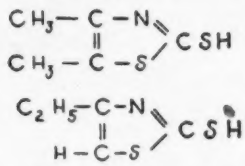
Ethers of Hydroquinone

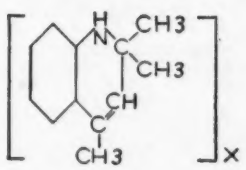

Monobenzyl Ether of Hydroquinone

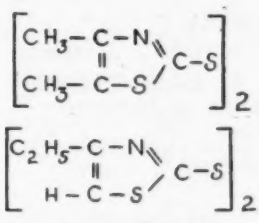

Dibenzyl Ether of Hydroquinone

Miscellaneous


Di-Isopropyl Dixanthogen


Mixed Ethyl and Dimethyl Mercaptothiazoles


Trimethyl Dihydro Quinoline Polymer


Mixed Aliphatic Thiazyl Disulfides

N-Nitroso Diphenylamine

All materials listed here are available in commercial quantities. Prices and technical information are available on request. Please write Dept. CE-9, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

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able and free flowing. Penco Benzene Hexachloride D-10 is compatible with most non-alkaline diluents such as pyrophyllite, clay and talcs. It is also compatible with other insecticidal and fungicidal agents, such as DDT, arsenate of lead, rotenone, neutral coppers and sulfur. This product is available in 50 pound and 100 pound fibrepak drums. Pennsylvania Salt Manufacturing Co.

PENCO BHC WB-10

A light tan to cream colored wettable micron-sized powder containing 10% of the gamma isomer of benzene hexachloride with special wetting and suspending agents. This product has been designed to be used as a water suspension spray for the control of many crop and livestock insect pests. This product is available in 60 and 100 pound fibrepak drums. Pennsylvania Salt Manufacturing Co.

PENCO EMULSION CONCENTRATE 9

An amber liquid containing 9% of the gamma isomer of benzene hexachloride dissolved in an organic solvent. This product contains special ingredients to give emulsion stability for specific agricultural and insecticidal users. It is primarily intended for use in the preparation of water emulsion sprays and shows promise for aphid, poultry lice and mite control. This product has a flash pt. (Tagliabue—open cup) of 110-115°F, bulk density of 8.9 lbs./gallons, coefficient of thermal expansion of 0.00049 ml/°F and will not crystalize down to 0°F. Available in limited quantities in five and fifty-five gallon drums. Pennsylvania Salt Manufacturing Co.

PENPHENE D-20

An impregnated micron-sized insecticide dust concentrate containing 20% chlorinated camphene, which can be used in 5% and 10% dusts, or in certain cases applied as 20% dust. This is another of the new synthetic insecticides that seem to show promise for control of certain insects, including grasshoppers, cotton aphid, cotton leafworm, bollworm, bollweevil, cotton fleahopper and also Southern green stink bug, cabbage loopers, webworm, hornworm, etc. Non-alkaline, iron free diluents such as are normally used with Penco DDT or Benzene Hexachloride dusts, can also be used with Penphene D-20. It is further compatible with DDT, Benzene Hexachloride, arsenate of lead rotenone, neutral coppers, sulfur and neutral emulsifying and wetting agents. This material is available in 100 pound fibrepak drums. Pennsylvania Salt Manufacturing Co.

PENPHENE D-40

This product is a dust base containing 40% chlorinated camphene, and is primarily intended for use by insecticide manufacturers in the formulation of finished insecticide dusts. It is a light colored, micron-sized dry powder, which may be readily mixed with non-alkaline diluents such as:— sulfur, pyrophyllite, clay and talc. It is also compatible with the other insecticidal and fungicidal agents: Benzene Hexachloride, DDT, lead arsenate, rotenone and neutral coppers. This material is available in 100 pound fibrepak drums. Pennsylvania Salt Manufacturing Co.

PENNCLEAN

A clear, colorless liquid acid milk stone remover. It contains a wetting agent and inhibitor which prevents the corrosion of stainless steel, tinned steel and tinned copper by the acid. This product, when used according to directions, removes and softens milk stone and casein on farm dairy utensils and dairy plant equipment, and is particularly recommended for use in high temp., short-time pasteurizers. This product weighs 9.3 pounds per gallon. It has a surface tension from 32-34 dynes/cm at 25°C and a coef. of cubical expansion not greatly different than water. The product is available in quart and gallon bottles. Pennsylvania Salt Manufacturing Co.

PENSAL—O

A heavy duty alkaline detergent for laundry use. This product is a buff colored, free-flowing powder containing alkali, surface active agents, and special absorbent ingredients. This product is a new type of detergent especially effective on very dirty classifications. It has unusual absorbing and emulsifying power for grease and oil, and can be used dry on the wheel or without soap. This product is available in 100 pound bags and 350 pound drums. Pennsylvania Salt Manufacturing Co.

PFIZER ENRICHMENT WAFERS

Newly formulated wafer designed for use in the baking industry to produce enriched bread conforming to accepted standards. Scientifically blended to give maximum speed of disintegration in water consistant with desirable hardness in order to avoid breakage. One tablet is used per 100 pounds flour. Type A wafers designed for the average bakery formula containing 3% or more non fat milk solids while Type B is intended for those using under this quantity. Each wafer type A, type B, contains: thiamin hydrochloride 190, 190 mg; Riboflavin, USP, 70, 90 mg; Niacin, USP, 1200, 1200 mg; Iron (as iron phosphate), 900, 900 mg. Chas. Pfizer & Co., Inc.

PLASTICIZER KP-70

Sp. Gr. at 20°/20°C., 1.015 ± 0.005; Boiling Range at 4 mm., 210-239°C.; Moisture, max. 0.1%; Color, max. #500 Pt-Co.; Odor, mild; Acidity, max. 0.1% as acetic acid; Freezing Pt., –45°C. (stiff gel); Flash Pt., 400°F.; R.I. at 25°C., 1.476; Hydrolysis, none; Solubility in Water at 25°C., Insoluble; Solubility of Water in, at 25°C., 1.0%; Gasoline Solubility, complete; Mineral Oil Solubility, complete. KP-70 is an excellent plasticizer for polyvinyl chloride, copolymers, butyral, and acetate; nitrocellulose; alkyds; chlorinated rubber; copal-ester, polystyrene; cellulose acetobutyrate; cellulose acetopropionate; ethyl cellulose; vinsol and many other resins including the various synthetic rubbers. To these resins it imparts high tensile strength; high elongation; low modulus; permanent flexibility; excellent hand and drape; excellent stability to ultra-violet light; low temperature flexability; low water extraction; heat stability; and facilitates smooth, high-gloss extrusions. Ohio-Apex, Inc.

PLASTIC TILE CEMENT

A powerful rubber-plastic cement developed to solve the difficult problem of laying plastic tile. Adheres plastic tile to almost every surface including concrete, brick, wood or metal. Easily applied by trowel to either floor or wall and allowed to dry for fifteen minutes after which time a protective skin forms on the surface. This skin is scratched or roughed up with a steel comb and then the tile is placed on the cement and allowed to dry. The cement is self-vulcanizing and its tensile strength continues to increase greatly for several days after application. Available in one and five gallon cans as well as in 55 gallon drums. Adhesive Products Corp.

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A series of modified phthalate plasticizers highly recommended for use in vinyl chloride polymers and vinyl chloride acetate copolymers.

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Some of these plasticizers are also compatible with vinyl butyral resins, polystyrene, nitrocellulose, etc. Typical plasticizers of this series are: Plastoflex #5, Plastoflex #50, Plastoflex #55. Advance Solvents & Chemical Corp.

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A "premium" cleaner designed for handling particularly stubborn cleaning jobs in dairies and other food plants. Especially effective in hard water areas. The product is a dry, white, free-flowing powder. Available in cases of 4-15 lb. fiber drums, 100 lb. fiber drums, 300 lb. fiber drums. Westvaco Chlorine Products Corp.

RESIN EMULSION 387-33

A stable aqueous dispersion of high molecular weight polyvinyl acetate; deposits hard, tough, continuous film. Easily plasticized with low cost plasticizers to yield flexible, homogeneous, clear films with excellent aging characteristics. Uses: adhesives—glues, pulpboard impregnants, textile finishing, water soluble paints. Conc., 55%; pH 4-5; viscosity 1100 cps. American Resinous Chemicals Corp.

RESIN EMULSION 474-12

A free-flowing acrylic copolymer dispersion characterized by an exceptionally fine particle size. Deposits a continuous, tough, clear, elastomeric, waterproof film with good low temperature flexibility. Absence of plasticizer or oxidizable components results in excellent aging characteristics. Uses: Pigment binder, coatings, textile finishing. pH 4-5. American Resinous Chemicals Corp.

RESIN EMULSION 735-43

A free-flowing stable, high solids, dispersion of polystyrene characterized by an exceutionally fine particle size. Deposits discontinuous, powdery film. Can be blended with natural and synthetic latices to reduce tack and increase tensile strength. Uses: Textile finishing, coatings, delustering agent. Conc., 50%; pH 10-11. American Resinous Chemicals Corp.

SANTOCEL C

A fine white powder produced by air-grinding silica aerogel. Used as a flatting agent to produce matte finishes in coatings of all types (lacquers, varnishes, vinyl resin coatings and resin dispersions); as a bodying agent for printing inks and non-aqueous liquids; as a bulking agent and free-flowing aid for dry powders; as an insecticide for stored grain insects; to aid in application of rubber cements; and as a reinforcing agent in rubber compounding. Dry bulk density: 6 lbs./ft. Sp. Gr., 2.2. R.I., 1.464. pH, 3.5 to 4.0. SiO_2, 89.5% to 91.5%. Oil absorption: too high for conventional test methods. Average particle size: 3 to 5 microns in diam. Available in commercial quantities. Literature available on request. Monsanto Chemical Co.

SANTOLITE HLA

Aryl sulfonamide — formaldehyde condensation resin. A clear, hard, brittle, nearly colorless resin. R.I. (25 grams resin in 75 grams normal butyl acetate), approx. 1.43 at 25°C. Uses: in lacquers makes films that are clear, colorless and of good gloss and adhesion. Decreases water permeability and increases tensile strength. Availability: Commercial quantities. Monsanto Chemical Co.

SPAN 65

Sorbitan tristearate. A light colored hard wax melting about 47° C. Used in formulating wax mixtures and as a co-emulsifier. Span 65 is the saturated acid counterpart of Span 85 (sorbitan tri oleate). Atlas Powder Co.

S-POLYMERS (S-50, S-60)

Modified, styrene-type resin, thermoplastic. Furnished as granules. Fabricated by injection, compression, and transfer molding, casting and extrusion. Resistant to acids, alkalis, water. Soluble in hydrocarbons and organic solvents. Max. continuous service T = 130 –140°F. Flexural strength > 4000 psi. Dielectric strength, volts / mill. inst., 500-700. Tensile strength to 6000 psi, Sp. Gr., .93-.96. Hardness, 10 Rockwell M. Low moisture vapor and gas permeability, internally plasticized, good compatibility with waxes, resins, good metal adhesion. Uses: hot melt or solvent—coated adhesives for packaging, compounding agent for electrical insulation, surface coatings. Enjay Co.

SYLVIOLA

An aromatic specialty, with a character of the precious wood type and a strong suggestion of orris-violet. A slightly amber and rather viscous liquid of ketonic nature, readily soluble in all essential oils and alcohol. Sylviola is not an ionone, but it blends well with this group of aromatics, particularly with Methyl Ionones, giving them brilliance, depth, and lasting quality without substantially changing their character, somewhat comparable to the effect obtained by orris. Uses: In floral bouquets, perfume, men's toiletries. Its use in soaps and cosmetics is safe and will not lead to discoloration. The Dow Chemical Co.

SORBIT P

A neutral 75% alkyl aryl sulfonate in flake form (density 0.3); for use in metal cleaners, wool carbonizing and dyeing, fire-fighting. Alrose Chemical Co.

STATEX K

A fine carbon black pigment produced by a radically new furnace process and designed primarily for the reinforcement of rubber as used in the manufacture of tires, mechanical goods, etc. Statex K is mildly alkaline due to its purity of surface (pH 8.5). It is moderate in development of reticulate chain structure, thus being suitable for compounding in both natural and synthetic rubber. Because of its surface characteristics, it is superior to black of channel origin in resistance to heat, to aging and to cracking under flexing. The particle diameter closely approaches that of channel black and because of this and other characteristics road wear results in tires are actually better than for channel carbon. Sp. Gr. is 1.80. Available in pelletized form in small quantities for experimental investigation. Binney & Smith Co.

STEELYFE 1

A water displacing corrosion preventive for indoor storage. It forms a soft, waxy coating which permits measuring and inspection. This coating can be removed by wiping, or with de-greasers, solvents, or alkaline cleaners for plating. It will protect all commonly used metals except magnesium. It is being used for protecting machined metal parts in indoor storage under summer conditions. It will remain removable even after standing for several years. For application economy, it is usually diluted with 3 to 12 times its volume of Stoddard Solvent. Bee Chemical Co.

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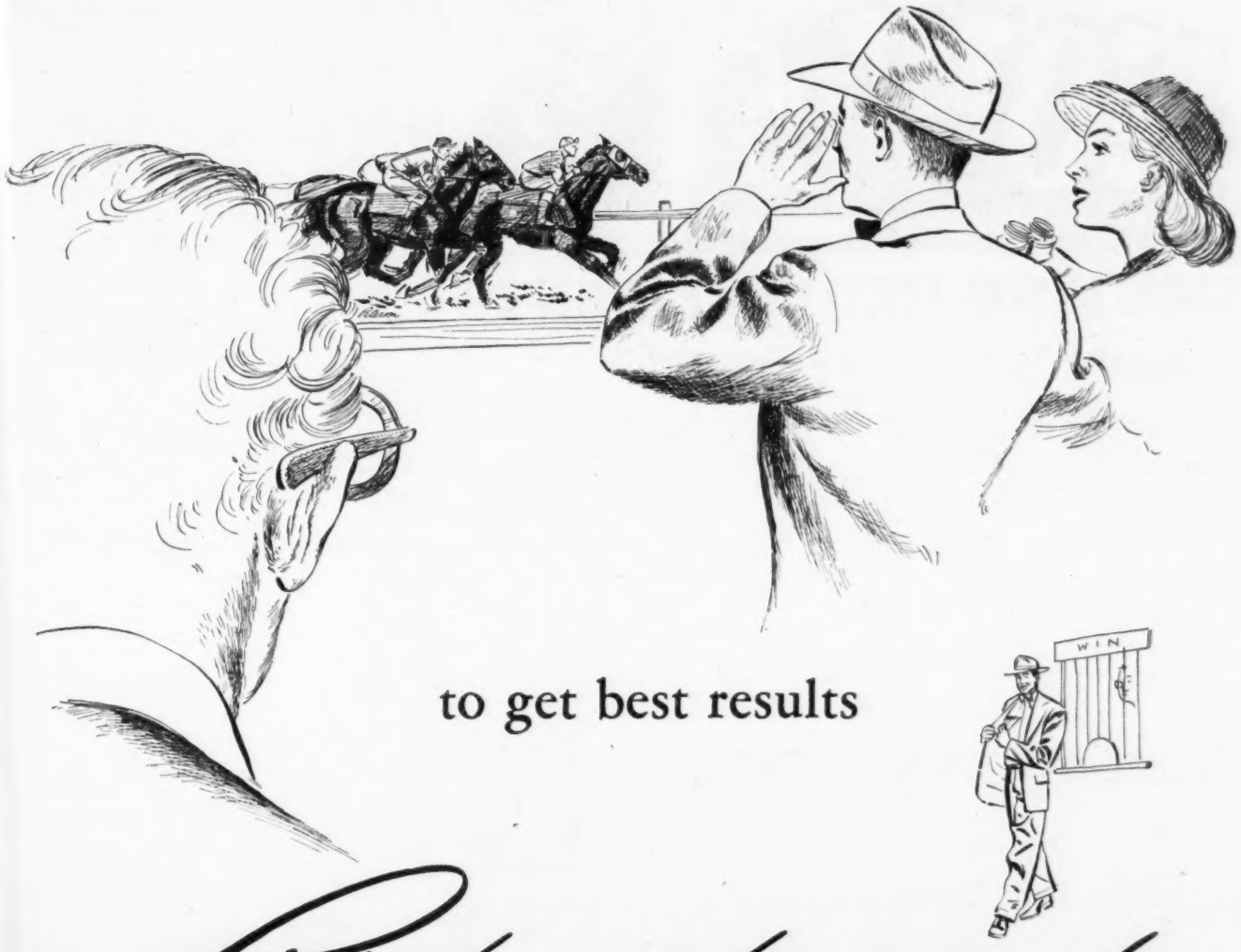

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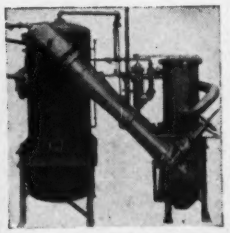

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TWEEN 21

Sorbitan mono-laurate polyoxyalkylene derivative. Surface active agent recommended as a wetting and dispersing agent for powdered materials. Light yellow liquid, dispersible in water. Atlas Powder Co.

TWEEN 65

Sorbitan tri-stearate polyoxyalkylene derivative. Saturated acid counterpart of Tween 85 (sorbitan tri-oleate polyoxyalkylene derivative). Amber, semi-solid, dispersible in water. Non-ionic general purpose emulsifier. Atlas Powder Co.

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Sulfated fatty acid derivatives. Appearance, clear mobile liquids. Color, amber. Properties, surface active agent suitable for a wide variety of applications. Resistant to salt, alkalis, mild aids. Uses, as wetting agent (E466R), as rewetting agent (E476R), as emulsifying agents, detergents. (As replacement for more costly sulfonated olive and castor oils. Available in carloads of drums. Emery Industries, Inc.

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WARCO WAX 102

A high melting, synthetic wax with excellent surface gloss. Warco Wax 102 has a minimum melting point of 132°C. and a penetration of 0.16 mm. at 25°C. with 200 gm. weight. Because of its high melting point, this product is finding wide use as an impregnant for paper which is to come into contact with boiling water. Because of its hardness and lustre it is useful in polishes—in some cases it is used alone and in some cases it is used to sophisticate low cost waxes. Warco Wax 102 also shows considerable promise in paper printing. Warwick Chemical Co.

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A complex quaternary ammonium compound which is used as an after treatment on direct-dyed rayon and cotton fabrics to reduce bleeding of color; the effect is stable to soaping. Warwick Chemical Co.

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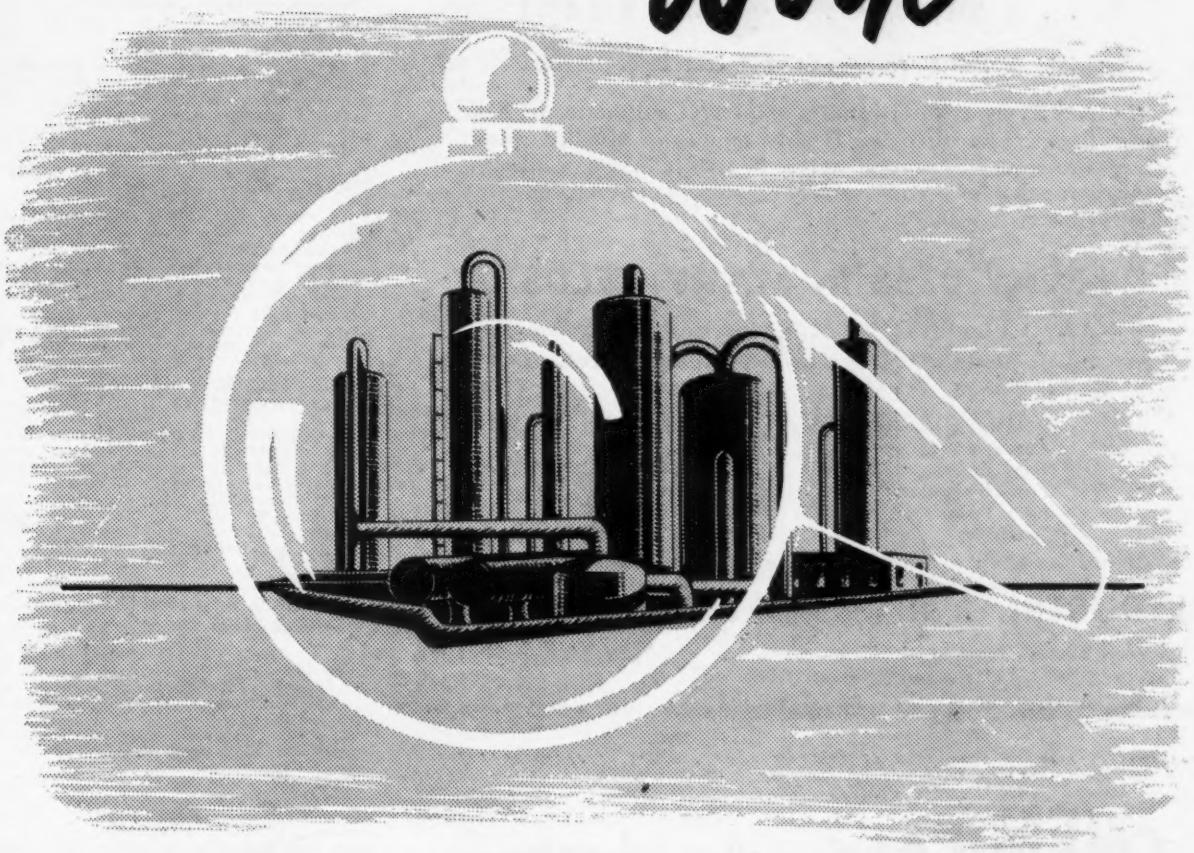

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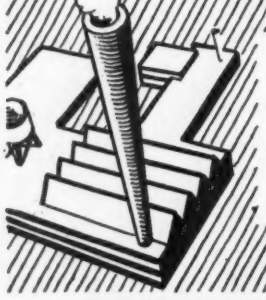

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WARCOSAN

A sulfated synthetic ester having excellent wetting, rewetting, and softening properties which make it ideally suitable as a Sanforizing assistant. Warwick Chemical Co.

WARCOTEX BM

A highly concentrated water dispersible synthetic wax which is being used as a "self-size" on spun rayon warps. It eliminates the need for gelatin, dextrine, etc. in the size; it produces smooth running warps; it is readily removed with simple scouring. Warwick Chemical Co.

WARCOWET A

A very efficient wetting agent which is recommended for use in baths containing moderate amounts of electrolytes; it is soluble and stable in baths containing moderate amounts of electrolytes; it is soluble and stable in baths containing up to 5% of sulfuric acid, caustic soda, or glauber salt. Another important feature is the fact that Warcowet A foams very little and the foam is very unstable. Warwick Chemical Co.

WESTVACO 50% BENZENE HEXACHLORIDE No. 1

A free flowing dry dust concentrate containing 50% of 12% gamma isomer Benzene Hexachloride. Designed for insecticide manufacturers as a readily blendable source of benzene hexachloride for insecticide dusts containing lesser concentrations of this compound either alone or together with other insecticides. Available in 125 lb. fibre cartons. Westvaco Chlorine Products Corp.

WESTVACO 50% BENZENE HEXACHLORIDE No. 2

A dry free flowing wettable dust concentrate containing 50% of 12% gamma isomer Benzene Hexachloride, together with a wetting agent. Mixes readily with water to form a dispersion which can be sprayed with hand or power sprayers. Compatible with other insecticides which are acid in water. Generally, 1 to 2 lbs. per 100 gallons of water (depending on the insect and severity of infestation) is used for control of agricultural crop insect pests. A partial list of insects controlled effectively includes cotton flea hopper, cotton aphid, corn seed maggot, lygus bug, onion thrip, pear psylla, southern green stink bug, strawberry weevil, wire worms and the woolly apple aphis. Usually 2 to 4 lbs. per 100 gallons applied as a dip or spray to farm animals will effectively control horn flies, biting stable flies, lice, ticks, tabanids and fleas. Available in 125 lb. fibre drums. Westvaco Chlorine Products Corp.

WESTVACO 50% DDT No. 1

A micron sized, free-flowing, dry dust concentrate containing 50% DDT. Designed for use by insecticide manufacturers as a source of easily blendable DDT for making household and agricultural insecticide dusts containing lesser percentages of DDT either alone or together with other insecticides. Talc, pyrophyllite or gypsum are generally used as diluents. Some uses for these diluted dusts are for residual dusting against adult mosquitoes in barns, poultry houses, grass and other adult mosquito resting places, and against lice and fleas on humans and dogs. A dust containing 5% DDT is generally used for the former use and a 10% DDT dust for the latter use. Available in 125 lb. fiber drums. Westvaco Chlorine Products Corp.

WESTVACO 50% DDT No. 2

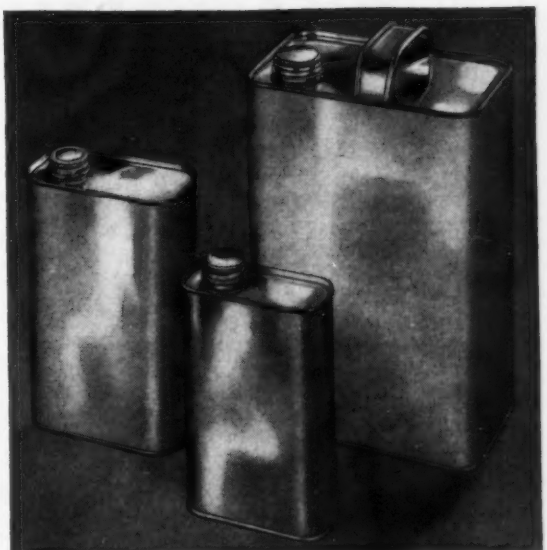
A dry, micron sized, free flowing, wettable dust concentrate containing 50% DDT. This dust mixes readily with water to form a dispersion which can be sprayed with hand or power sprayers. Generally 1 to 2 lbs. are used per 100 gallons of water (depending on insect and severity of infestation) for the control of most agricultural crop insect pests. A partial list of insects controlled effectively includes cabbage worms, coddling moth, Colorado potato beetle, grape leafhopper, japanese beetle, leafrollers, lygus bug, oriental fruit moth, potato flea beetle, potato leaf hopper, potato psyllid and thrips. For use on farm animals 1 lb. per 25 gallons of water is applied as a dip or spray for control of fleas, hornflies, lice and sheep "ticks". In farm buildings ½ lb. per gallon of water will form a suspension which will effectively cover 1000 square feet of surface for control of fleas, gnats, houseflies, mosquitoes and ticks. As a mosquito larvacide it is applied to breeding places at a concentration of 1 lb. per 5 gallons of water. Available in 125 lb. fiber drums. Westvaco Chlorine Products Corp.

We're catching up!

Production's galloping ahead—and although orders are still slightly in the lead at present, we're hoping to fill them soon.

The outlook is bright because our facilities for turning out cans have been vastly expanded, and today many raw materials are being scratched off the "shortage" lists.

Please accept our thanks for your patience during the "shortage years," and don't hesitate to call us if you'd like further information. Just contact the nearest Continental sales office.



"F"-style cans for insecticides, waxes, automotive polishes, etc. These are available in a wide range of sizes from 6-oz. to one-gallon. All have easy-pouring, dispensing top.

CONTINENTAL CAN COMPANY

100 EAST 42nd STREET, NEW YORK 17 N. Y.

TRONA

BROMINE

Muriate and Sulphate of POTASH

REFINED POTASSIUM CHLORIDE
SODA ASH • SALT CAKE
LITHIUM CONCENTRATES

THREE ELEPHANT BORAX and BORIC ACID

TRONA

AMERICAN POTASH & CHEMICAL CORPORATION
122 EAST 42nd STREET • • • NEW YORK 17, N. Y.

231 S. LA SALLE STREET CHICAGO 4, ILLINOIS
214 WALTON BUILDING ATLANTA 3, GEORGIA
609 S. GRAND AVENUE LOS ANGELES 14, CALIF.

waxes QUALITY DT BRAND

MICROCRYSTALLINE
WAXES
OZOKERITES
CERESINES
WHITE, YELLOW, BLACK
Full Range of Melting Points

CARNAUBA CANDELILLA
OURICURY
Crude and Refined

SEND FOR BULLETIN D

DISTRIBUTING & TRADING CO.
444 MADISON AVENUE, NEW YORK 22

WETTING AGENTS FROM PETROLEUM SULFONATES

Water-soluble alkyl aryl petroleum sulfonates with the following typical analysis: Active ingredients, 25-50%; Mol. Wt., 275-375. The above analysis represents a range of wetting agents and detergents useful in a variety of industries. Uses: Particularly adaptable to the formation of various cleaning compounds; in textile and leather processing, ore flotation, mine dust laying, crude oil emulsion splitting, air entrainment of cements and wherever wetting agents or detergents are required. L. Sonneborn Sons, Inc.

WHEELYFE 85

For extreme freedom from loading. A grinding coolant which will not load the wheel, even with the finest grit sizes. This coolant sinks chips well, because of the complete freedom from loading and from filming on the work. Therefore, any metallurgical conditions caused by overheating of the surface is completely avoided. Wheelyfe 85 also gives proper corrosion protection and will never become rancid. Recommended dilution: 1 gallon of Wheelyfe 85 to 30 gallons of water. Bee Chemical Co.

WOOD GLUE 645-20

A "cold" working liquid resin glue, ready to use as is, or dilutable with water. Requires no heat or pressure other than that supplied by normal clamping operations. Has a perfect, transparent, resilient bond that is ready for machining or sanding within 20 minutes. Nonabrasive and will not dull saws and woodworking tools. Economical because there is no heating or hardening of the glue and product possesses an unlimited working life as against current urea and phenolic glues. Solids 55%. American Resinous Chemicals Corp.

XYNO RESIN 362

A viscous thermoplastic resin dispersion containing approximately 55% solids. Recommended for extreme stiffening effects on textiles, especially nylon netting, and as a coating for paper and leather where suitably plasticized. Available in developmental quantities. Onyx Oil & Chemical Co.

XYNO RESIN AA-40

A vinyl resin dispersion containing approximately 40% solids. Recommended as a versatile general purpose resin finish for cotton, rayon, and acetate constructions which can readily be manipulated to give a range of effects from a full, mellow hand to good body and stiffness. Useful in combination with plasticizers as a spray coating for leather. Availability: Production quantities. Onyx Oil & Chemical Co.

XYNO RESIN S-69

A thermoplastic resin dispersion containing approximately 35% solids. Recommended for stiffening fabrics where better wash-fastness is desired. Available in pilot plant quantities. Onyx Oil & Chemical Co.

Company Addresses

Adhesive Products Corp.
1660 Boone Ave., Bronx 60, N. Y.

Advance Solvents & Chemical Corp.
245 Fifth Ave.
New York 16, N. Y.

Allied Chemical & Dye Corp.
National Aniline Div.
40 Rector St., New York 6, N. Y.

Alrose Chemical Co.
180 Mill St.
Cranston, R. I.

Amecco Chemicals Inc.
60 East 42 St.
New York 17, N. Y.

American Cyanamid Co.
30 Rockefeller Plaza
New York 20, N. Y.

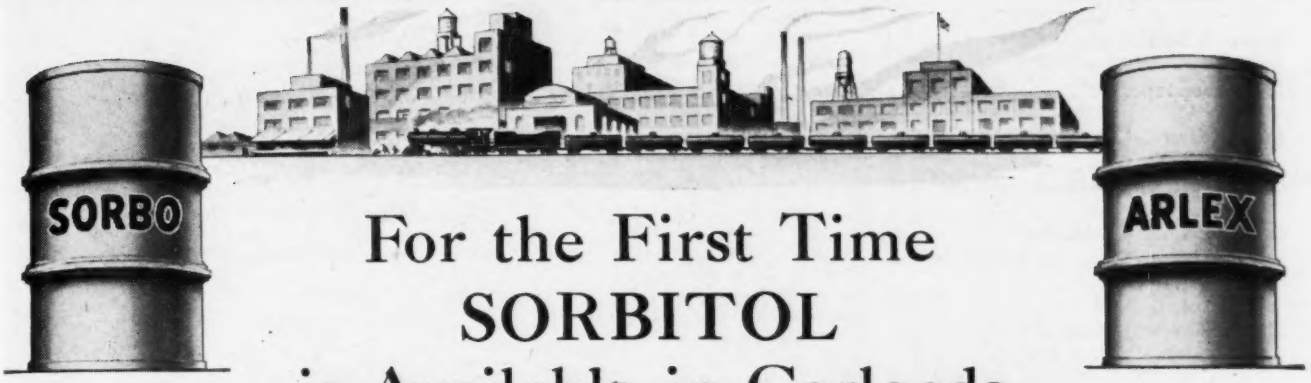
American Resinous Chemicals Corp.
Peabody, Mass.

Armour and Co.
1355 W. 31st St., Chicago, Ill.

Atlas Powder Co.
Wilmington 99, Del.

Ansbacher-Siegle Corp.
Rosebank, Staten Island
New York

Bee Chemical Co.
63 East Lake St., Chicago 1, Ill.



For the First Time SORBITOL is Available in Carloads

–With a New Concept of Purity– for New Uses and New Thinking

Where once it was tons, now it is carloads. Greatly expanded production facilities—just completed—have opened fresh vistas for the chemical industry, and suggest new evaluation of this remarkable chemical.

Sorbitol, a hexahydric alcohol, may be used advantageously

–As a Manufacturing Ingredient in

DRYING OILS	ESTERS
HARD RESINS	ETHERS
ALKYDS	PLASTICIZERS

–As a Conditioning Agent and Humectant in

COSMETICS	GELATIN	GASKETS
FLEXIBLE GLUES	CHEWING GUM	POLISHES
LEATHER	CANDY	YEAST
PAPER	TOBACCO	SOFT DRINKS

PHARMACEUTICALS PRINTERS' ROLLERS

Available in Two Grades... in Drums or Tankcars

SORBO

A 70% aqueous solution of D-sorbitol. Water-white, with clean, sweet taste. No odor. For synthesis and moisture-conditioning. By improved technique, this grade is now offered in greater purity than ever before.

ARLEX

Atlas commercial sorbitol solution, containing closely related polyhydric materials which make it non-crystallizing. For flexibilizing and moisture-conditioning.

Sorbo, Arlex—Reg. U. S. Pat. Off.

Visit us, Booth 69
Pacific Chemical Exposition

The Atlas technical staff is especially qualified to discuss sorbitol applications with you. Bring your problems to us.

ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

B. F. Goodrich Chemical Co.
Rose Bldg., Cleveland 15, Ohio
Binney & Smith Co.
41 E. 42 St., New York 17, N. Y.
Bios Laboratories
607 W. 43 St., New York 18, N. Y.
Buffalo Electro-Chemical Co.
Station B, Buffalo 7, N. Y.
Carbide and Carbon Chemical Corp.
30 E. 42 St., New York 17, N. Y.
Celanese Corp. of America
180 Madison Ave., New York 16, N. Y.
Charles Pfizer & Co.
11 Bartlett St., Brooklyn 6, N. Y.
Chemo Puro Mfg. Corp.
48th Ave. and Fifth St.
Long Island City 1, N. Y.
City Chemical Corp.
133 W. 22 St., New York 11, N. Y.
Colgate-Palmolive-Peet Co.
105 Hudson St., Jersey City 2, N. J.
Columbia Organic Chemicals Co., Inc.
600 Capitol Place, Columbia 55, S. C.
Commercial Solvents Corp.
Terre Haute, Ind.
Dow Chemical Co.
Midland, Mich.
Edwal Laboratories, Inc.
732 Federal St., Chicago 5, Ill.
E. I. du Pont de Nemours & Co.
Wilmington 98, Del.
Eimer and Amend
633 Greenwich St., New York 14, N. Y.
Emery Industries
4300 Carew Tower, Cincinnati 2, Ohio
Emulsol Corp.
59 E. Madison St., Chicago 3, Ill.
Enjay Co., Inc.
26 Broadway, New York 4, N. Y.
Eston Chemicals Inc.
3100 E. 26 St., Los Angeles 23, Cal.
Fairmount Chemical Co., Inc.
600 Ferry St., Newark 5, N. J.
Farchan Research Laboratories
609 E. 127 St., Cleveland 8, Ohio
General Chemical Co.
40 Rector St., New York 6, N. Y.
Glyco Products Co., Inc.
26 Court St., Brooklyn 2, N. Y.
Halogen Chemicals Inc.
616 King St., Columbia 52, S. C.
Harshaw Chemical Co.
1945 E. 97 St., Cleveland 6, Ohio
Julius Hyman & Co.
Denver, Colorado
Kelco Co.
31 Nassau St., New York 5, N. Y.
Merck & Co.
161 Sixth Ave.
New York 13, N. Y.
Metal Hydrides Inc.
12-24 Congress St.
Beverly, Mass.
Metalloy Corp.
Rand Tower
Minneapolis 2, Minn.
Metal & Thermite Corp.
120 Broadway
New York 5, N. Y.
Monsanto Chemical Co.
St. Louis 4, Mo.
Neville Co.
Neville Island
Pittsburgh 25, Pa.
Novadel-Agene Corp.
Lucidol Div.
1740 Military Rd.
Buffalo 5, N. Y.
Ohio-Apex, Inc.
Nitro, W. Va.
Onyx Oil & Chemical Co.
15 Exchange Place
Jersey City 2, N. J.
Paisley Products Inc.
1770 Canalport Ave.
Chicago 16, Ill.
Pennsylvania Salt Mfg. Co.
1000 Widener Bldg.
Philadelphia 7, Pa.
Rohm & Haas Co.
Washington Square
Philadelphia 5, Pa.
Sharples Chemicals Inc.
123 S. Broad St.
Philadelphia 9, Pa.
Shell Chemical Corp.
Shell Bldg.
San Francisco 6, Cal.
L. Sonneborn Sons, Inc.
88 Lexington Avenue
New York 16, N. Y.
Standard Oil Co. (Indiana)
910 S. Michigan Ave.
Chicago 80, Ill.
Takamine Laboratories Inc.
Clifton, N. J.
United Carbon Co., Inc.
Charleston 27, W. Va.
Velsicol Corp.
120 E. Pearson St.
Chicago 11, Ill.
Victor Chemical Works
141 W. Jackson Blvd.
Chicago 4, Ill.
Virginia Smelting Co.
West Norfolk, Va.
Warwick Chemical Co.
West Warwick, R. I.
Westvaco Chlorine Products Corp.
405 Lexington Ave.
New York 17, N. Y.
Winthrop Chemical Co., Inc.
170 Varick St.
New York 13, N. Y.
Wyandotte Chemicals Corp.
Wyandotte, Mich.

PACIFIC CHEMICAL EXPOSITION

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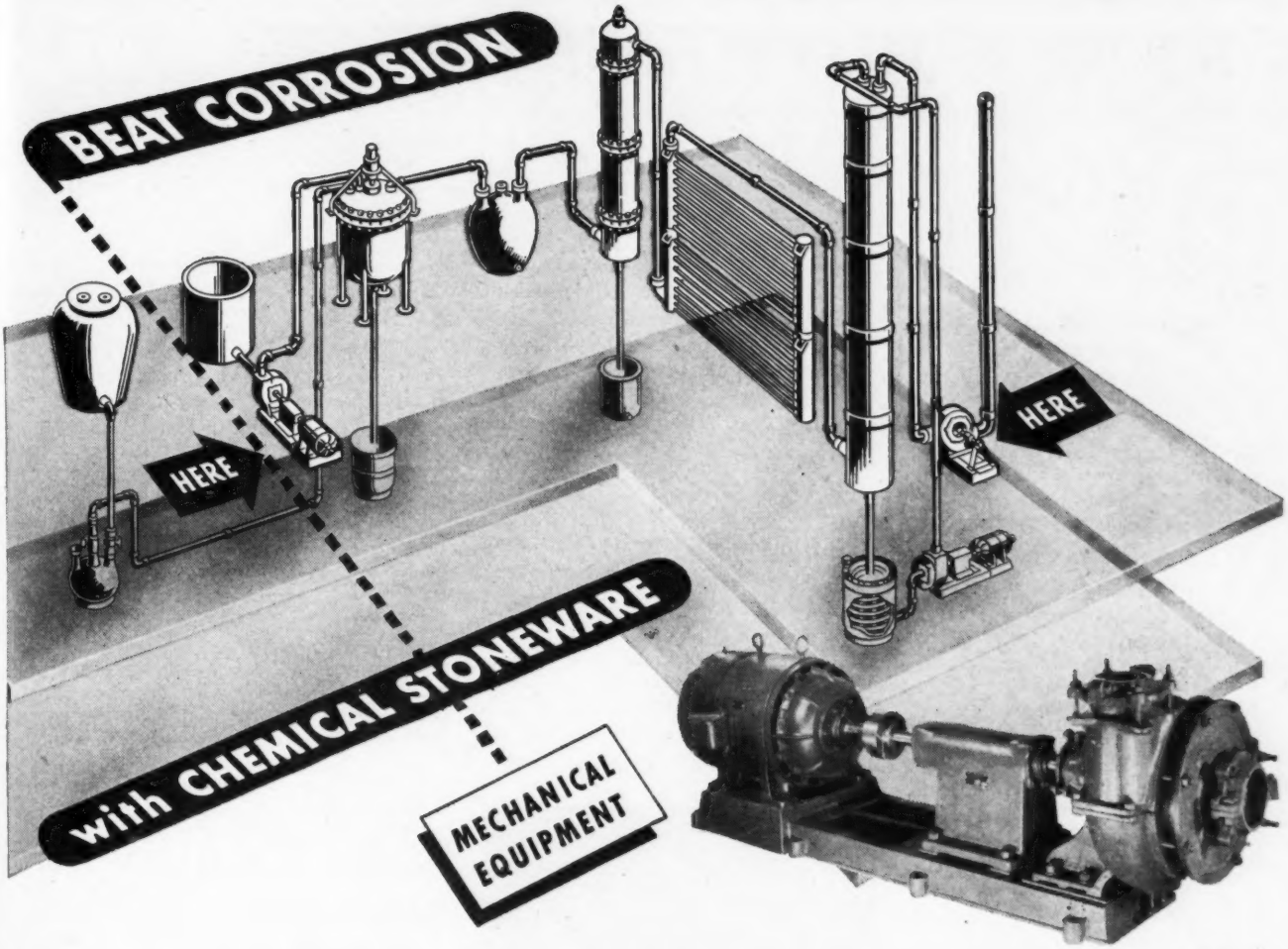
Special Activities

PACIFIC INDUSTRIAL CONFERENCES.—A most important part of the many activities associated with the Pacific Chemical Exposition is the series of pacific Industrial Conferences. Everyone registering (no fee) at the Exposition is welcome to attend any or all of the series. Programs of the twelve cooperating organizations are as follows: *Western Chemical Markets,* Western Chemical Market Research Group, Tu AM, PM; *Plant Growth Regulators,* Pacific Insecticide Institute, Tu PM; Analytical Division, Calif. Section, Amer. Chem. Soc., Tu PM, Th PM, F PM; Petroleum Group, Calif. Section, Amer. Chem. Soc., Tu PM, W PM, Th PM; *Process Equipment,* Northern Calif. Section, A. I. Ch. E., W AM, PM; *Non-Metallic Minerals,* Industrial Minerals Division and San Francisco Section, A. I. M. M. E., and Non-Metallic Mining Committee, San Francisco Chamber of Commerce, Th AM, PM; Northern Calif., Los Angeles Rubber Groups, Th PM, F PM; Golden Gate Paint and Varnish Club, Th PM; Northern and Southern Calif. Sections, Institute of Food Technologists, F AM, PM, Sa AM.

INDUSTRIAL MOVIES.—A program of thirty industrial motion pictures will be shown Tuesday through Saturday. Most of them will have three showings, a few of them only two.

SPECIAL EXHIBITS.—The four regional research laboratories of the U. S. Department of Agriculture will present an extensive display of their work on utilization of agricultural products. The U. S. Geological Survey will present an exhibit dealing with the natural resources of eleven Western states, disclosing many finds made during the war. The National Bureau of Standards will display results of its work on hydrocarbons. Special Libraries Association will show in its exhibit how its work contributes to research.



CENTRIFUGAL PUMP

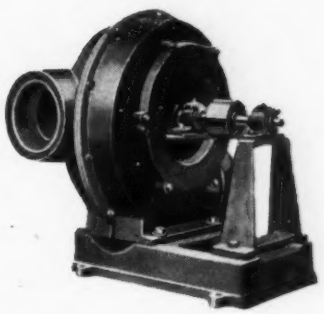
Pumps and exhausters are the traffic cops of chemical plants. It is the duty of this mechanical equipment to direct the flow of liquids and gases, to keep them moving along at a uniform rate. And like all traffic cops, they must be *dependable*.

Dependability eliminates costly shut-downs of equipment for repairs—is one important reason why pumps and exhausters made of General Ceramics Chemical Stoneware have won such wide acceptance. This unique material is absolutely corrosion-proof against all acids except hydrofluoric. It has high mechanical strength, high resistance to thermal shock and assures permanent, trouble-free installations.

Exhausters made of General Ceramics Chemical Stoneware perform several important jobs. In the movement of acid gases, they provide an artificial draft which places the operation under complete control and permits the installation, or any part of it, to be operated under a plus pressure. They accelerate chemical reactions between gases, thus increasing plant capacity. And, they are used for ventilation purposes.

All parts of General Ceramics centrifugal pumps and exhausters that come in contact with the liquid or gases are made of chemical stoneware. Exposed parts are protected by metal shrouds. Both pumps and exhausters are available in belt-driven and direct-driven models.

Write for Bulletin 211 for a complete description of General Ceramics Stoneware Pumps—Bulletin RA for more information on General Ceramics Stoneware Exhausters. Or if you have a specific problem, send us complete details and we will give you our recommendations.



EXHAUSTER

3056

GENERAL CERAMICS AND STEATITE CORPORATION
CHEMICAL EQUIPMENT

BUFFALO: 610 Jackson Bldg. **CHICAGO:** 20 N. Wacker Drive
LOS ANGELES: 415 So. Central Ave. **PORTLAND 5, ORE.:** 410 New Fliedner Bldg.
SEATTLE: 1411 Fourth Ave. • **SAN FRANCISCO:** 598 Monadnock Bldg. • **TACOMA:** 417 Tacoma Bldg.
MONTREAL: Canada Cement Bldg. • **TORONTO:** Richardson Agencies, Ltd., 454 King St., West
VANCOUVER, B.C.: Willard Equipment Ltd., 860 Beach Ave.

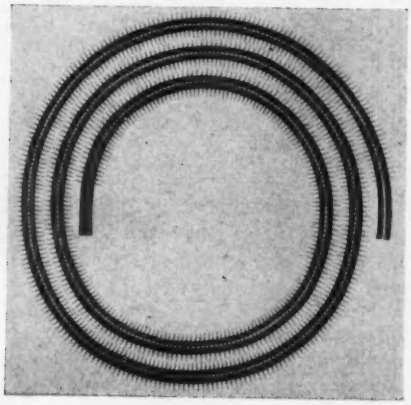
In addition to the manufacturing facilities of the Chemical Equipment Division those of the Insulator Division are also available for handling ceramic problems in all branches of industry. General Ceramics & Steatite Corporation is therefore able to offer service covering all industrial applications of ceramic products.

General Ceramics
AND STEATITE CORP.
CHEMICAL EQUIPMENT DIVISION
KEASBEY, NEW JERSEY

NEW EQUIPMENT

Coiled Finned Tubing QB 308

Coiled finned tubing of the serrated fin type is now available from Fintube Coil



Corp. For these tubes, flat or pancake coils are now formed out of tubing with serrated fins as high as 5/8 inch without crushing or distortion of the fins.

Finco flat coils are now available in either ferrous or non-ferrous materials and in a wide range of tube sizes, fin heights, fin spacings and coil diameters.

Tablet Compressing Under Vacuum QB 309

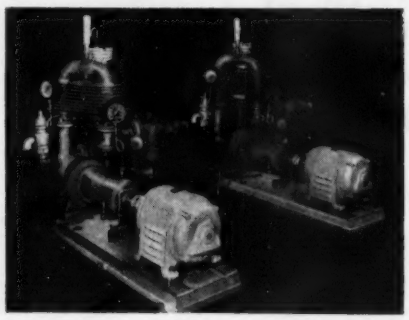
The usual method of tablet pressing at atmospheric pressure has certain limitations however, especially in feeding and in the compressing of materials in which entrapped air tends to reduce press operating speeds, or cause laminations in pieces produced.

To overcome these difficulties, F. J. Stokes Machine Co. has developed a new machine and technique for compression under vacuum. The press applies a maximum of 20 tons pressure from above and below, has a die fill of 2 5/8" and will produce pieces up to 3" dia.

Pressure from above is exerted by means of an adjustable eccentric crank and on the lower punch by cam action. A vacuum chamber surrounds the die table, the punches and the feeding device. The feed hopper, with vacuum cover, is attached to the top of the vacuum chamber and a receptacle under vacuum receives the finished parts at the side of the main vacuum chamber. Special stuffing boxes seal the upper and lower plungers where they enter the chamber. In other respects this new RV-4 press is similar to the widely used Stokes R-4.

High Pressure Condensate Return System QB 310

To return condensate to high pressure boilers from presses, dryers, and other steam-heated process equipment, Cochrane Corp. has developed the new "CBA" high pressure condensate return system. This new unit gives added capacity with lower horsepower motor ratings and can be used for return of condensate to higher



pressure boilers. Similarly, lower pressure condensate can be returned direct to boilers in the 100 to 150 psi range than was formerly possible. A standard 5-hp unit will handle 15 gpm at 50 psi differential and a 5-hp "CBA" will handle the same quantity at 150 psi differential.

A specially-designed centrifugal pump draws water from the thermofin priming loop and discharges it as a high velocity jet through the jet pump nozzle. This jet, striking the returned hot condensate, induces condensate flow through the mixing tube into the thermo-fin priming loop. The additional volume of the returned condensate introduced into the constantly filled loop results in the discharge of an equal volume of condensate through the air separator. Then after expulsion of the entrained air from the closed circuit, the condensate is returned to the boiler at temperatures close to that of process pressure without flash loss.

Rubber Flashlight QB 311

Approved by Underwriters' Laboratories, Inc. for Class 1, Group D, Hazardous Locations, this new patented Rub-R-Lite "K2" flashlight of Lennan Lights,

Inc. has all working parts in a small "sealed-in-head" unit, which is "popped" in or out of the steel-lined Neoprene case, when bulb or batteries are changed.

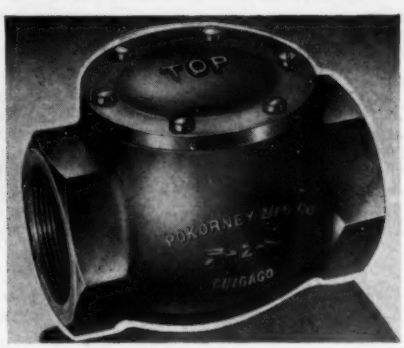
Magnetic Pulley QB 312

The new permanent magnetic pulley of the Homer Manufacturing Co. is designed for use as head pulley in belt conveyor systems, to remove ferrous metal particles and pieces from materials being conveyed.

These pulleys are built of cast aluminum and steel and are available in all standard diameters above 10 inches, and in widths that are multiples of 6 inches. They are amply ventilated to dissipate any heat created by belt slippage or friction.

Swing Check Valves QB 313

Pokorney Manufacturing Co. has introduced a new line of swing check valves, the "3000" series. The manu-



facturer states that these valves offer the advantages of sensitivity to low flow, full flow through the valve with minimum resistance, non-leaking through the check, and a free action check mechanism which will not stick on minimum flow.

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (9-7)
Please send me more detailed information on the following new equipment:

QB 308	QB 310	QB 313	QB 316	QB 319
QB 309	QB 311	QB 314	QB 317	QB 320
	QB 312	QB 315	QB 318	QB 321

Name .....Position .....
(Please print)

Company .....

Street .....

City .....Zone .....State .....

SHARPLES

THE SUPER-D-CANTER . . .

A new and highly efficient centrifuge for the recovery of solids from pumpable slurries. . . . Continuously separates and discharges both solids and liquid. . . . Automatically compensates for fluctuations in the ratio of solids to liquids, assuring a homogeneous output. . . . Adjustable for use as a Clarifier, Dehydrator or Classifier.

SOME TYPICAL APPLICATIONS

- Casein Recovery
- Fish Meal from Press Liquor
- Dehydration of Fine Crystals
- Clarification of Vegetable Oils

The SHARPLES CORPORATION

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NEW YORK 17, N. Y. 501 Fifth Avenue
CHICAGO 4, ILL. 80 E. Jackson Boulevard
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EXECUTIVE OFFICES AND FACTORY, 2300 WESTMORELAND STREET, PHILADELPHIA 40, PENNA.

The **SOLUTION** *to many difficult Problems in Research and Plant Laboratories Has Resulted from the Application of the New*

CHARLOTTE
COLLOID MILL

MODEL N.D. 1 OPEN FOR INSPECTION

A Sturdy, Compact Machine for Laboratory and Small Commercial Operation.

Patterned After the Larger Models, It Is Precision Built for Constant Operation, and Is Sturdy and Rugged in Construction. Readily Cleaned and Sterilized.

The Charlotte Colloid Mill is well known in the *Chemical, Pharmaceutical, Cosmetic, Food* and other fields, where it is daily proving its value to these and other industries.

Wherein *Emulsion, Homogenization, Disintegration* or *Thorough Blending* are necessary and desirable, there is no machine that can accomplish more, and still give *continuous production* with consequent saving in production costs and floor space.

For a Thoroughly Blended, Homogeneous Product, with a finer texture, use the CHARLOTTE. We know that you will be well satisfied with its performance as have so many others.

The Charlotte Colloid Mill is manufactured in sizes ranging from 1 h.p. to 75 h.p.

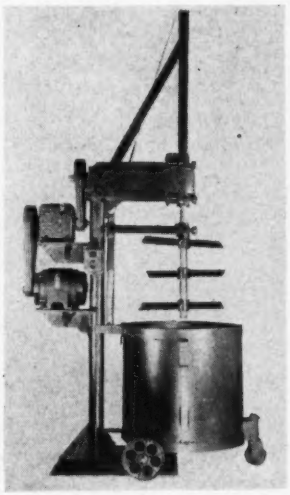
Send for descriptive catalog.

CHEMICOLLOID LABORATORIES, Inc.
44 WHITEHALL STREET
NEW YORK 4, NEW YORK

They are now available in both screwed and flanged types, in bronze aluminum and grey iron, in I. P. S. sizes of ½" to 6". Larger sizes will be available later.

Change Can Mixer QB 314

The new change can mixer of Allied Steel and Equipment Co. can be used for



pastes as well as liquids and has a speed range from 42 to 146 rpm. A 5 hp motor drives three paddle type agitators through a four speed transmission in a 150 gal steel change can.

Hand-Operated Power Truck QB 315

Lewis-Shepard Products, Inc., has added a 6,000 lb. capacity, completely electric, platform model truck to their line of power jack lifts. This hand operated truck retains all of the features of the 4,000 lb. model.

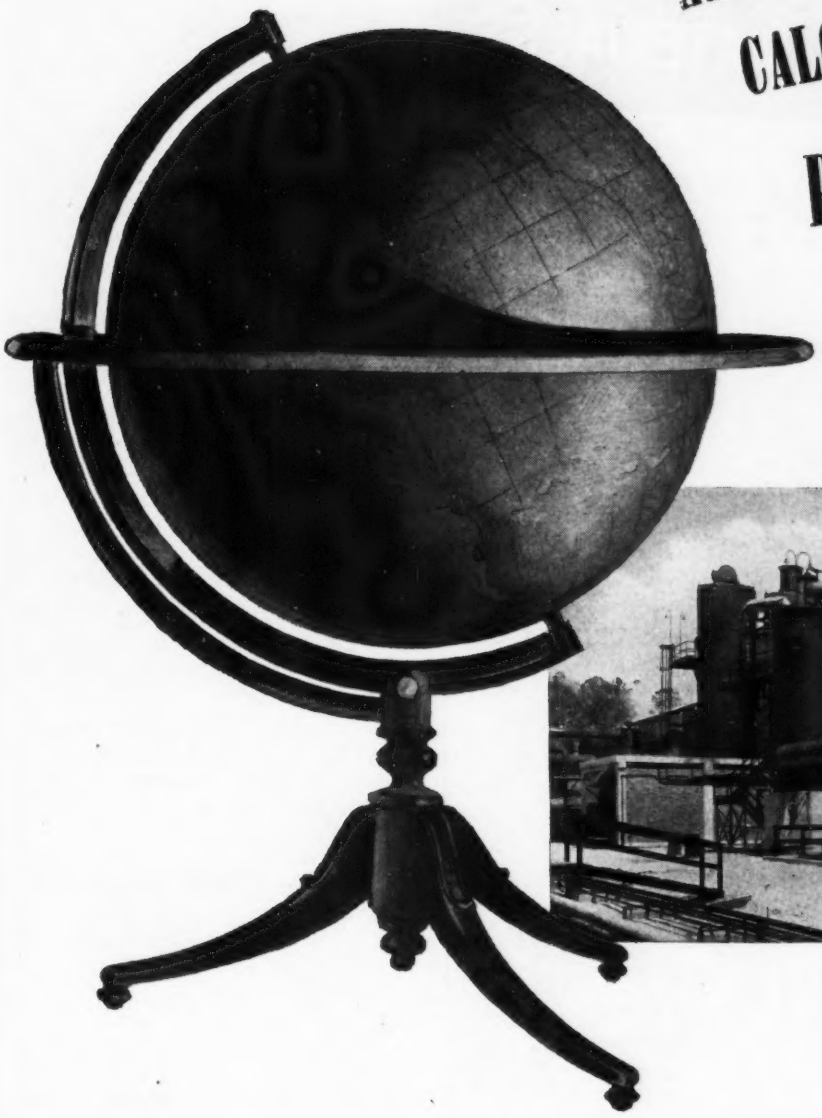
Revolving Carriage for Fork Lift Truck QB 316

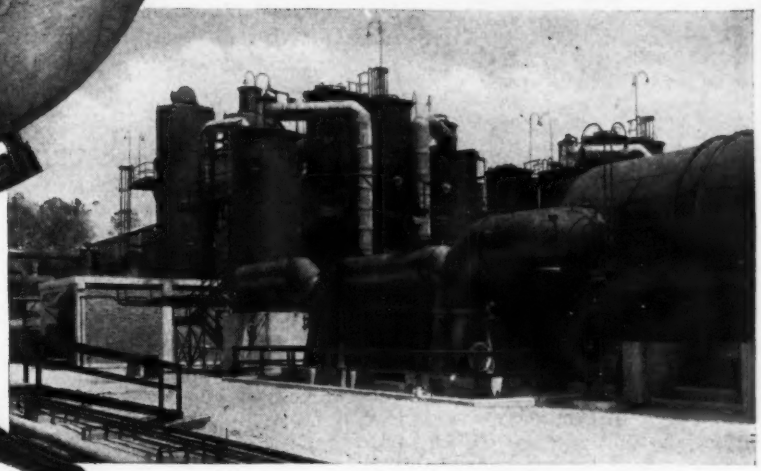
The new revolving carriage of Towmotor Corp. is designed for handling

solid, liquid or granular bulk materials which require movement from one container to another.

The revolving carriage revolves in a 360° circle in either direction, with power being supplied by a hydraulic motor through a chain drive. Operation is controlled by a valve located near the lift truck operator. With the revolving car-

ARUBA
CALCUTTA
PHILADELPHIA
ET CETERA





Chemico's service is complete . . . includes origination of processes when necessary, the design and construction of the plant, training of operating personnel, initial operation of the plant . . . all this backed by an overall performance guarantee.

★ In countries both strange and distant, and in cities not over a few hours away . . . you will find Chemico plants in operation. There are more than 600 Chemico installations, each specially designed to meet individual requirements. ● Chemico builds plants for the production, concentration and recovery of sulfuric acid, the synthesis of ammonia, and the production of nitric, hydrochloric, and phosphoric acids, phosphates and synthetic methanol . . . has been doing it for 33 years. ● This wide experience provides immeasurable benefits to those who commission Chemico to design and construct their heavy chemical plants. ● Preliminary recommendations are furnished without obligation.

CHEMICAL CONSTRUCTION CORPORATION

EMPIRE STATE BLDG., 350 FIFTH AVE., NEW YORK 1, N. Y.
European Technical Representative: Cyanamid Products, Ltd., Brettenham House, Lancaster Place, London W. C. 2, England
Cables: Chemiconst, New York

"Chemico plants are profitable investments"

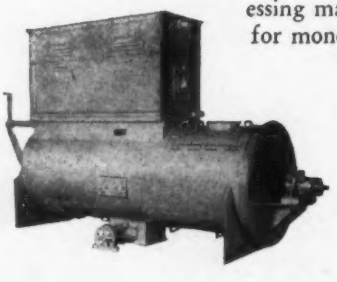
CC-145

WANT ABSOLUTE UNIFORMITY IN YOUR MIXED MATERIALS?

Accepted industry-wide as the best means of obtaining maximum uniformity in mixed materials, the horizontal mixer as manufactured by Sprout-Waldron sets new high standards of efficiency.

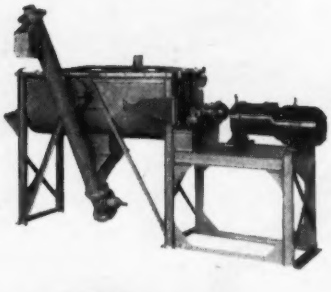
Horizontal mixers are generally considered "tops" for uniformity of their resultant mixture. This fine uniformity is secured in all S-W horizontal mixers from the 2½ cu. ft. capacity up to and including the huge 550 cu. ft. mixers. Sprout-Waldron will custom build a mixer to meet your needs no matter how special they may be. We fabricate mixers from practically any metal or wood . . . jacket them for "cooking" or "cooling" . . . line them with glass, porcelain, rubber, etc.

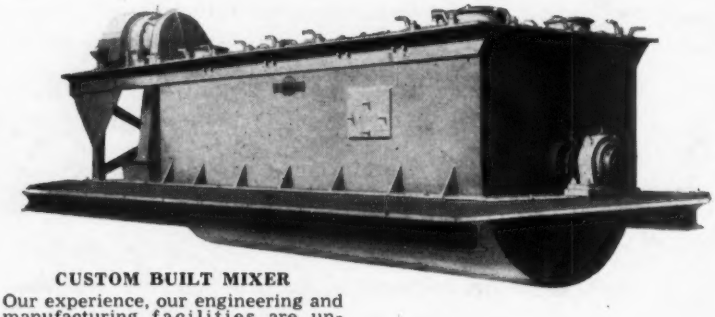
Buy Sprout-Waldron for the finest in processing machinery . . . look to Sprout-Waldron for money-saving advice.



DUST-TIGHT VENTED MIXER
This completely agitated, vented mixer with dust-tight assembly and brush sifter is a part of a unique S-W Intimate Blending System now producing agricultural dusts of unmatched uniformity. 1 to 11 tons per hour capacity.

HORIZONTAL STAINLESS STEEL MIXER
A compact, self-contained unit designed especially for a pure food product.





CUSTOM BUILT MIXER
Our experience, our engineering and manufacturing facilities are unequalled for the design and fabrication of special mixers. Manufactured from stainless steel, non-ferrous metal, wood, ordinary steel or cast iron, and lined with glass, porcelain, rubber, etc., as desired.

SPROUT-WALDRON & COMPANY

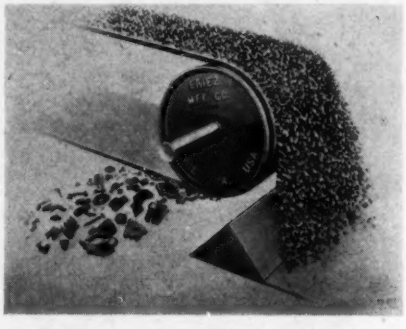
Manufacturing Engineers

MUNCY **PENNSYLVANIA**

riage, a container mounted on the truck forks can be turned 180° to provide complete dumping, in approximately five seconds. Installation of the revolving carriage accessory does not affect the normal operation of the fork lift truck.

Magnetic Pulley QB 317

An Alnico alloy permanent magnet is the only power required to energize the



non-electric pulleys of the Eriez Manufacturing Co. Use of this pulley prevents tramp iron from contaminating bulk products as they are moved from point to point in the plant on belt conveyors.

Horizontal Belt Conveyor QB 318

The Levelbelt of Standard Conveyor Co. is a horizontal belt conveyor of a standardized design available in lengths of 21 to 161′. It is available in standard heights of 28, 32 and 36″.

The drive mechanism is standardized for power up to 1 HP to operate at a speed of 60′ per minute in either direction. The takeup for maintaining belt tension is incorporated with the drive mechanism.

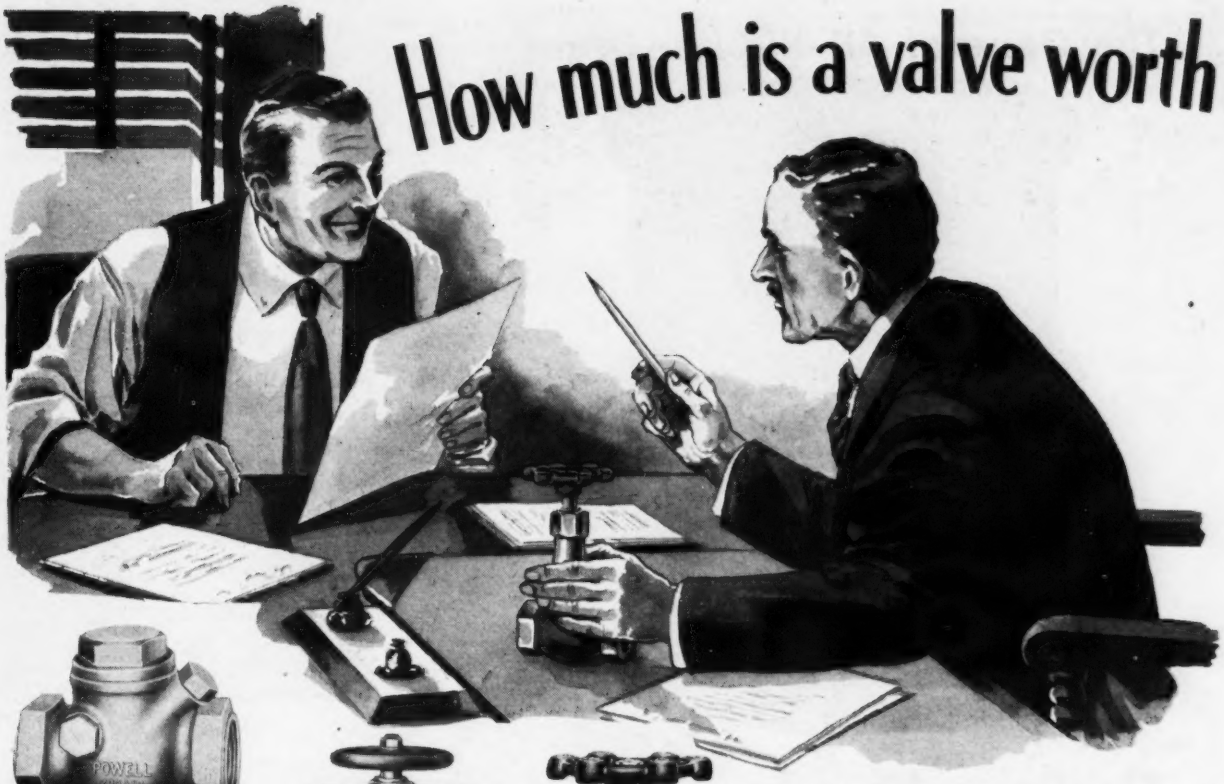
A roller type bed is used with 1.9″ diameter ball bearing rollers placed at 8″ centers. The conveyor is available in two standard widths of 14″ and 24″ belts.

Pressure Transmitter QB 319

The pressure transmitters, having high accuracy with a large electrical AC or DC signal, of the Autoflight Instruments

Div. of G. M. Giannini & Co., are designed for use with various gases and liquids such as air, oxygen, water, oil, gasoline, alcohol, hydraulic fluids, and aniline. The Series 4600, combine con-

How much is a valve worth?



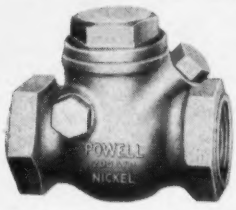


Fig. 1845—200-pound Pure Nickel Swing Check Valve with screwed ends, screwed-on cap and regrindable, renewable disc.

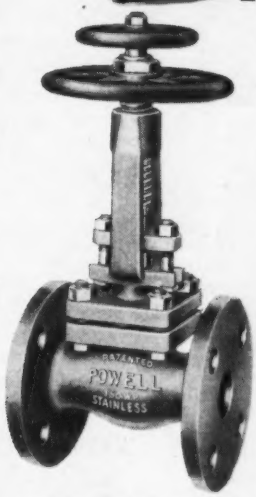


Fig. 1979 S. W.—150-pound Stainless Steel Globe Valve with flanged ends, bolted flanged yoke and outside screw stem. Equipped with Powell Patented Seat Wiper.

Fig. 1828 — 200-pound Monel Metal Gate Valve. Screwed ends, screwed-in bonnet and inside screw rising stem.

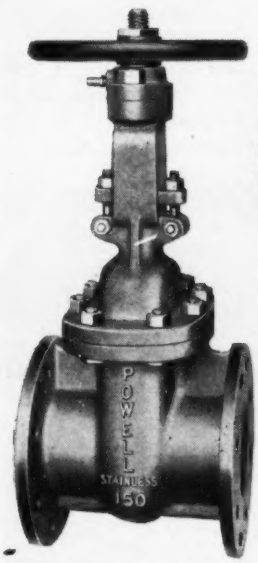


Fig. 2453-G—New, Standard 150-pound Stainless Steel Gate Valve with outside screw rising stem, bolted flanged yoke-bonnet and taper wedge solid disc.

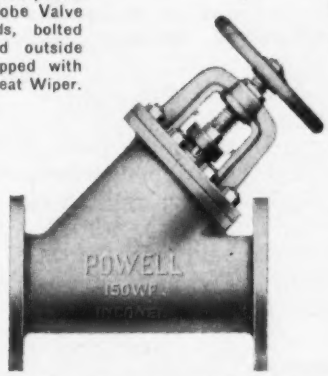


Fig. 1944—Large Size 150-pound Inconel* "Y" Valve with flanged ends, bolted flanged yoke-bonnet and outside screw rising stem.

*A registered trade name of the International Nickel Company, Inc.

The $64 question is not "what is the price of the valve," but "how much is it worth?"

And the measure of its worth is "will it do the job, how long will it give satisfactory service, and what will be the ultimate cost of maintenance?" For in addition to the cost of labor and materials in maintaining a valve, don't lose sight of the serious loss in production while a valve is "down" for repairs or replacement.

The Powell Line is so complete* that there's always a Powell Valve specifically adapted to do the job. Powell Valves are noted for long-life, satisfactory service. Powell Valves are designed to reduce maintenance and shut downs to a minimum.

*The Powell Line includes Bronze and Iron Valves of every required type, design, size and pressure; Cast Steel Valves of every type, in pressure classes from 150 to 2500 pounds; and, for the chemical and process industries, a complete line of Corrosion-Resistant Valves in the widest range of pure metals and alloys ever used in making valves.

The Wm. Powell Company
Cincinnati 22, Ohio
DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

POWELL VALVES

The General All-Rubber Drum

A Safer Package for Corrosive Liquids

Drums are stacked high to save storage and shipping space.

Lighter, unbreakable drums can be rolled—handled—stacked faster.

Of approx. 13 gallon capacity General All-Rubber Drums weigh 50% less (empty) than boxed glass carboys of equal capacity. They require only 1½ sq. ft. of floor space per drum as compared with 4 sq. ft. required for boxed glass carboys.

These lighter drums are handled faster and more easily by fewer men because they can be rolled, stacked high, and stored either indoors or out—contents are never exposed to light. Their flexible all-rubber construction permits greater safety in handling, eliminating the danger of breakage, spillage, and corrosion.

No maintenance is required for General All-Rubber Drums, many of them have been in acid service for over 10 years and are still in good condition. General All-Rubber Drums are approved under ICC specification 43-A for shipping muriatic, fluosilicic, hydrofluoric, and 47% sulphuric acids. Write us, specifying types of liquids to be handled and we will advise you as to best lining, closure, etc. for your purpose.

Compare

	Rubber Drum (13-Gal.	Boxed Glass Carboy approx. size)
Weight empty	35 lbs.	70 lbs.
Floor space	1¼ sq. ft.	4 sq. ft.
Height	20½ inches	30 inches.
Drums to carload	500	250
Total acid weight per car, 60,000 lbs.		30,000 lbs.

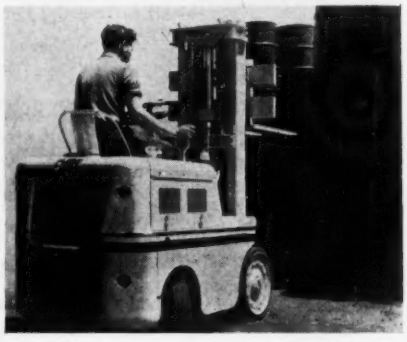
Sole Distributor

Maurice A. Knight, 209 Kelly Ave., Akron 6, Ohio

trolled action bellows or bourdon tubes, and Microtorque potentiometers, into one rugged unit. These units can be supplied in resistances ranging from 100 to 20,000 ohms; and ranges of 0 to 500 psi with special ranges on application. The accuracy is 2%; approximate weight 1.3 pounds; overall length under 6 inches; maximum width 3 inches.

Fork Truck QB 320

The new fork lift truck of Clark Tructractor combines a tiering height of 130

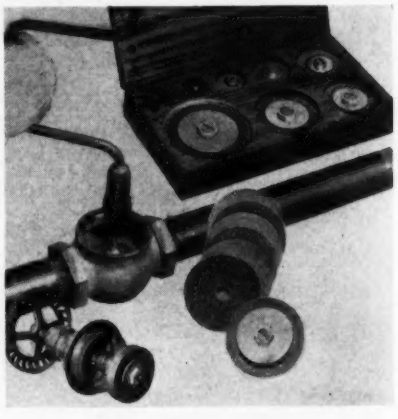


inches and overall collapsed height of only 83 inches.

Outstanding among the features is 63 inches of lift before there is any increase in the minimum overall height of the machine. It will carry a maximum load of 4000 lbs.

Valve Reseating Tool QB 321

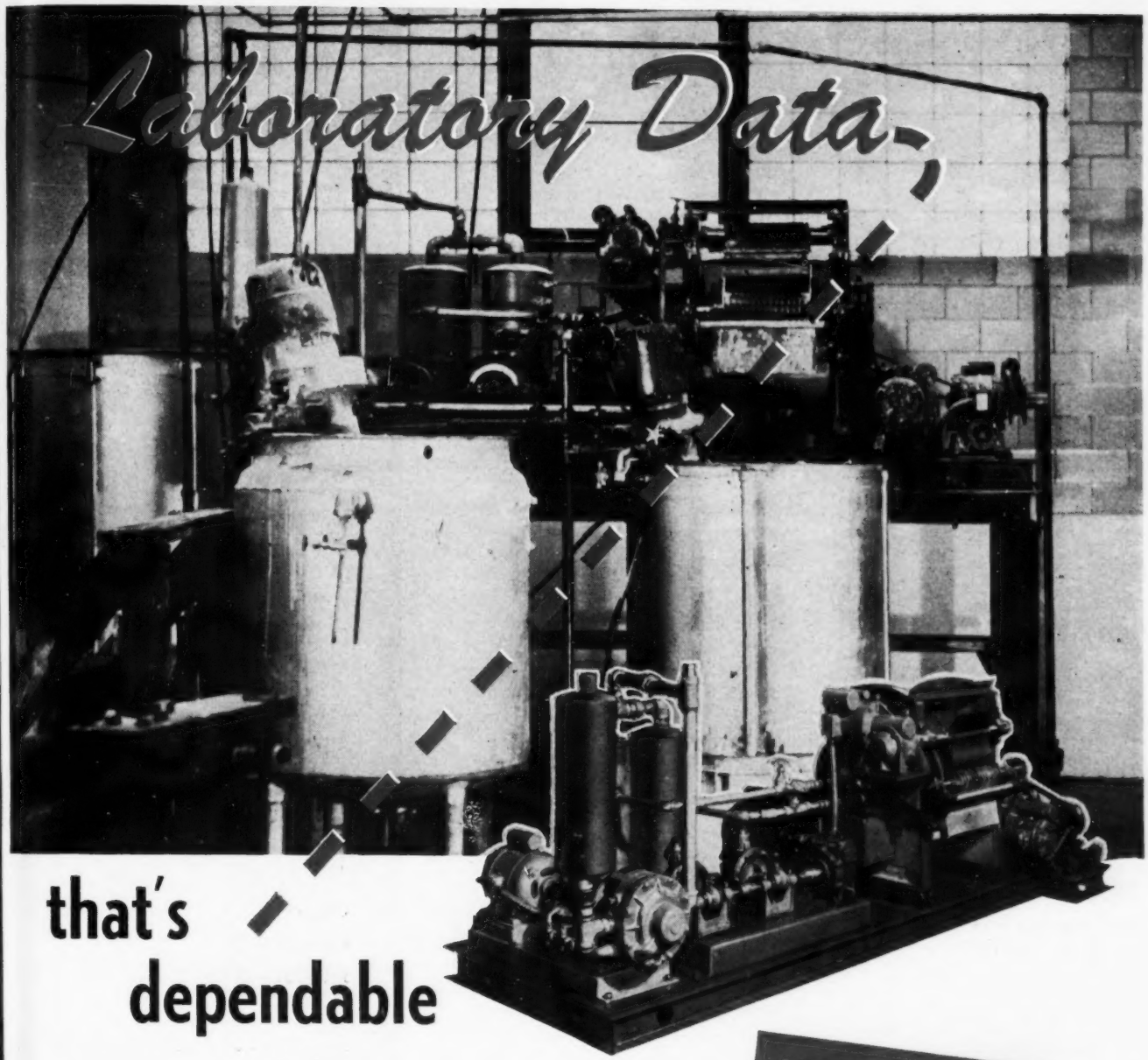
The Pivot valve reseatng tool of Grace Products Co. employs aluminum-oxide abrasive discs mounted on both sides of a wafer-thin steel body and is so constructed



that the tool is operated by means of a brace equipped with screw-driver bit. It can be used for globe, angle and check valves.

No special guides or jigs are required and it is not necessary to dismantle the bonnet and stem assembly of valve.

One side of the tool has a coarse abrasive disc to grind away the seat defects rapidly while the disc on other side is finer for polishing. These tools are available in eight sizes for valves from ½" to 3" inclusive.



that's dependable

Laboratory data on filterability of a product can be definitely determined on the Eimco Laboratory Type Filter Unit. These small compact units are available as either drum or disc units and with all necessary operating equipment mounted on a fabricated steel subbase or the bare filter unit can be purchased separately.

Reliable data can be obtained from these units in the lab because they are proportionately constructed with regard to Eimco's larger production units of continuous vacuum filters.

Eimco laboratory continuous vacuum filters are made of stainless steel, monel and many other materials to meet the demands of processing plants or independent laboratories. These filters can also be equipped with flappers and scoring devices, as shown, if desired.

Eimco production size Continuous Vacuum Filters for Metallurgical, Food, Chemical, Starch, Beet Sugar, Cane Sugar, Cement, and Flue Dust processes, Coal Dewatering, Salt and Sand Drying and Sewage Sludge Dewatering. Filters made to process the customer's product.

EIMCO

THE EIMCO CORPORATION

Executive Offices and Factories — Salt Lake City 8, Utah: Branches — 67 Wall St., New York 5 — 3319 So. Wallace, St., Chicago 16—Mills Bldg., El Paso—1217 - 7th St., Sacramento 14

1146

PACKAGING & SHIPPING

by T. PAT CALLAHAN

Phenol Unloading

A new manual sheet TC-6, entitled Unloading Phenol from Tank Cars, issued by the Manufacturing Chemists' Association, 608 Woodward Building, Washington 5, D. C., has just been issued. The need for such a manual has been felt for a long time, and this excellent manual is highly recommended for all people handling phenol from tank cars. We think it of such importance that we list the subjects in the order in which they appear in the manual:

1. Description of Product
2. Protective Equipment
3. First Aid
4. Safety Precautions
5. Placement of Car for Unloading
6. Tank Car Dome Fittings
7. Venting
8. Steaming or Melting
9. Sampling
10. Unloading with Pump
11. Unloading with Air Pressure
12. Bottom Unloading
13. Preparation of Empty Car for Return Movement
14. Piping from Unloading Point to Storage Tank
15. Possible Unloading Difficulties
16. Return of Empty Tank Cars
17. Railroad Defect and Bad Order Cards
18. Examination of Empty Car

Copies of this manual are vailable for 20 cents each and will be sent on request by the Manufacturing Chemists' Association.

Continuous Roll Shipping Containers

A new type of packaging medium has been announced by Sherman Paper Products Corp. The new product, which will be marketed under the name of Corroflex Tube-Tainer, is described by the manufacturer as "cushioned containers in continuous rolls."

The Tube-Tainer is manufactured of Corroflex, a flexible-corrugated cushion packaging material which is widely used in packing. Its advantages of saving time, material, shipping weight and cube, are claimed to be carried still further in the Corroflex Tube-Tainer, a ready-made container in roll form.

Originally developed during the war as a sleeve used in packing palletized shipments of artillery shells, continued experiment and research led to the continuous roll feature of the new product.

Corroflex Tube-Tainer is supplied in stock rolls 250 feet long, in a variety of widths. To use it, the packer simply cuts or tears off the correct length from a roll mounted at his bench, inserts the product, and closes the ends. Any standard closure may be used with the Tube-Tainer: taping, tying with either wire or twine, stapling, steel-strapping.

Corroflex Tube-Tainer will be stocked and sold by approximately 200 paper distributors throughout the U. S. In addition to the stock sizes, special widths and lengths can be made to order. Samples and photographic data sheets may be obtained from the manufacturer at Newton Upper Falls 64, Mass.

Packing Material

Delicate equipment can be protected against damage during shipment by spongelike cellular rubber pads developed by United States Rubber Co.

The pads are readily fabricated from sheet material and will protect equipment weighing from five pounds to several hundred pounds. They are said to be particularly useful for packing expensive television equipment and electronic devices.

The rubber derives its cushioning ability from millions of microscopic cells filled with nitrogen. The cells "give" slightly under pressure but do not flatten out as do the cells of regular sponge rubber.

ICC Amends Rules

The Interstate Commerce Commission amended the regulations for the transportation of explosives and other dangerous articles on July 28, 1947. A summary of the prominent changes as they affect the industry follows:

The following products were added to the regulations in the commodity list, section 4: benzyl bromide; bromine trifluoride; peracetic acid; tetrafluorethylene, inhibited.

Section 150, which is the definition of an inflammable solid, has been amended as follows:

> An inflammable solid is a solid substance other than one classified as an explosive, which is liable, under conditions incident to transportation, to cause fires through friction, through absorption of moisture, through spontaneous chemical changes, or as a result of retained heat from the manufacturing or processing.

This amended definition is the same as the previous definition with the exception of the addition of the words "or as a result of retained heat from the manufacturing or processing," which is added to the end of the definition.

Section 183 has been amended as follows:

CASE HISTORY No. 18

One in a series of factual experiences of a group of American manufacturers with Multiwall Paper Bags.

TOTAL AMOUNT SAVED (PER LB.)

Saved by Producer through use of Multiwalls

Saved by Customers thro use of Multiwa

CLASS OF PRODUCT PACKE

CEMENT	FERTILIZER
CHEMICALS ✓	FOOD
FEEDSTUFFS	MISCELLANEOUS

PRODUCT CHARACTERISTICS

ABRASIVE	GRANULAR ✓
CORROSIVE	HEAVY
DELIQUESCENT	HYGROSCOPIC
FLUFFY	LIGHT
FREE-FLOWING ✓	VISCOUS

St. Regis Packaging Systems are designed to meet a wide range of product requirements and plant layouts. Packers are available in a variety of sizes and types, with filling speeds as high as twenty-four 100-lb. bags per minute—with one operator. Nearly 400 commodities—rock products, fertilizers, chemicals, foods, and feeds—are now being packaged in sturdy, low-cost multiwall paper bags.

Multiwall Paper Bags Save Money for Producer and Customers

One of America's large chemical companies has installed St. Regis valve bag filling machines to pack one of its products in 50-lb. multiwall paper bags. Formerly, this company had used fibre drums.

The changeover to Multiwalls provided these

BENEFITS TO THE PRODUCER

- Saving in container cost.

  A saving in packing and handling costs of approximately ¾¢ per lb. Here is the way this was achieved:
- Only one freight car of empty Multiwalls was required to package the same amount of material as *ten* cars of empty drums.
- Empty Multiwalls required 65% less storage space than drums.
- Multiwalls required 15%-20% less storage space than filled drums.
- 30 filled Multiwalls can be loaded on a pallet, resulting in fast and efficient movement to storage and shipping rooms.
- Lower tare weight of Multiwalls.

BENEFITS TO CUSTOMERS

- Saving in material costs through reduced prices of product packed in Multiwalls.
- Multiwalls open easily and quickly.
- Multiwalls' convenient size reduces handling effort. Workers prefer Multiwalls.
- Shop handling and labor costs reduced.
- Compact Multiwalls increase storage space 15%-20%.
- Multiwalls are readily resold to used bag dealers. An extra profit item.

For the complete story of this *MONEY SAVING PACKAGING OPERATION* simply mail the coupon. Learn how the basic principles of St. Regis' economical packaging system can be applied to *your business*.

MULTIPLY PROTECTION • MULTIPLY SALEABILITY

ST. REGIS SALES CORPORATION

(Sales Subsidiary of St. Regis Paper Company)

NEW YORK 17: 230 Park Ave. CHICAGO 1: 230 No. Michigan Ave.
BALTIMORE 2: 1925 O'Sullivan Bldg. SAN FRANCISCO 4: 1 Montgomery St.
ALLENTOWN, PA: 842 Hamilton St.

Mail this coupon for the complete story

OFFICES IN OTHER PRINCIPAL CITIES — IN CANADA.
ST. REGIS PAPER CO. (CAN.) LTD. MONTREAL • VANCOUVER • HAMILTON

ST. REGIS SALES CORPORATION
Dept. FP, 230 Park Avenue, New York 17, N. Y.

Without obligation, please send me full details regarding "Case History" No. 18, outlined above.

NAME_____

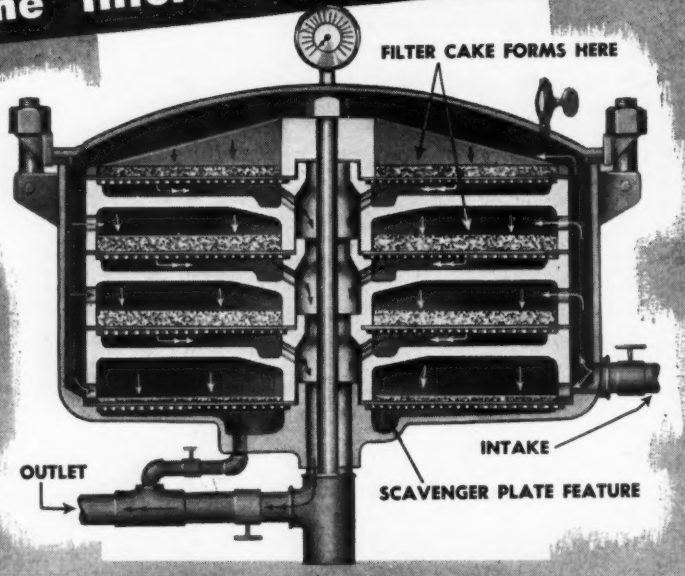
COMPANY_____

ADDRESS_____

the *horizontal plate* principle

makes SPARKLER

the "filter that filters all liquids"



SPARKLER

horizontal plate

FILTERS

. . . here's the story:

A FEW OF MANY PRODUCTS THAT CAN BE FILTERED WITH SPARKLERS

Acids
Alcohols
Alkalis
Beverages
Candy scrap
Caustics
Chemicals
Cleaning fluids
Extracts
Flavors
Gums
Hydraulic fluids
Lubricants
Milk
Molasses
Oils
Pharmaceuticals
Plating solutions
Resins
Shellacs
Soap, liquid
Syrups
Varnishes
Water
Wines

★ Sparkler Horizontal Plate Filters handle any liquid from heavy varnishes to light alcohols.

★ Equally efficient performance on intermittent or continuous operation, under a wide range of temperature, pressure and viscosity conditions.

★ Equally effective whether removing carbons and contact clays or clarifying and polishing with filter aids.

★ Patented Scavenger Plate permits *complete* batch filtration. (It's virtually an auxilliary filter with an independent control valve.)

★ Unexcelled filter cake stability — no slipping or breaking.

. . . why?

Because filter media are supported on a horizontal plane and filter aids floated into position uniformly; filtration takes place uniformly over entire filtering areas. Flow through filter is always *with* gravity.

Sparkler Filtration Is *Engineered* Filtration—we invite correspondence on your problem. You will receive the advice of filtration scientists with a quarter of a century of experience in a specific field.

SPARKLER MANUFACTURING COMPANY
MUNDELEIN, ILLINOIS

Nitrate of aluminum, nitrate of ammonia, nitrate of barium, nitrate of lead, nitrate of potash, nitrate of sodium (nitrate of soda), nitrate of strontia, nitro carbonitrate, calcium nitrate, or other inorganic nitrates and guanidine nitrate, are exempt from specification packaging, marking, and labeling requirements for transportation by rail freight, rail express, and highway when packed as follows: In metal cans in outside fiberboard boxes; in wooden boxes, kegs, or barrels, metal cans, metal drums or fiber drums; in glass bottles in outside fiber boxes not exceeding 50 pounds net weight; calcium nitrate in bags; ammonium nitrate, or guanidine nitrate, in bags containing not over 200 pounds, net weight, made moisture proof, tight against sifting, and of strength not less than bags made of 8-ounce burlap. When for transportation by carrier by water they are exempt from specification packaging, marking other than name of contents, and labeling requirements. (See column 5 of Commodity List, Part 2, for maximum quantity that may be shipped in one outside package by express.)

The purpose of this amendment is to permit 3 to 5 gallon glass bottles which have proved adequate for a number of years in the shipment of non-dangerous chemicals.

Section 186C has been added, incorporating authorization to ship peracetic acid. This addition reads as follows:

(a) Peracetic acid must be shipped in solution not exceeding 40 per cent strength and must be packed in specification containers as follows:

(b) Spec. 15A, 15B, 15C, 16A or 19A.—Wooden boxes with inside containers which must be: Glass or earthenware, not over one gallon capacity each, cushioned with sterile absorbent cotton or other cushioning material which will not react with the contents to generate heat. Cushioning material must be in sufficient quantity to completely absorb the contents of the inner container.

(c) Spec. 12B.—Fiberboard boxes with inside containers which must be: Glass or earthenware, not over one quart capacity each, cushioned with sterile absorbent cotton or other cushioning material which will not react with the contents to generate heat. Cushioning material must be in sufficient quantity to completely absorb the contents of the inner container.

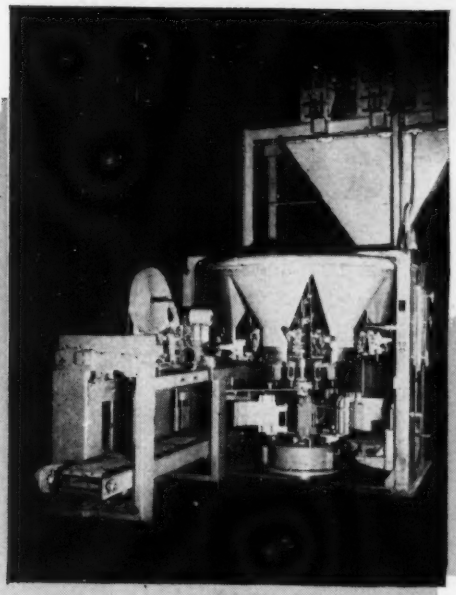
(d) Spec. 1A or 1C.—Carboys not over 5 gallons capacity, or spec. 1D carboys.

Section 247 has been amended by the following addition:

(k) Spec. 103A or 103A-W.—Tank Cars. Authorized for benzyl chloride only. When shipped in unstabilized condition, the lading must be anhydrous and must be free from impurities such as iron. Tanks for these cars must be made of solid nickel at least 99 per cent pure and all cast metal parts of the tank in contact with the lading have a minimum nickel content of approximately 96.7 per cent.

This amendment provides for the ship-

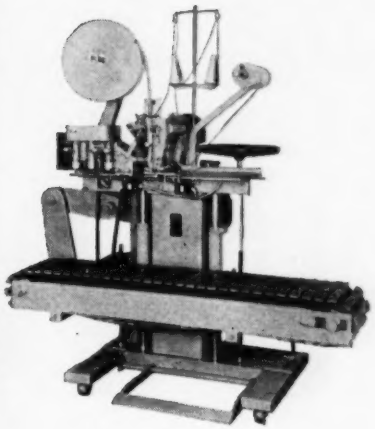
SEE OUR EXHIBIT
PACIFIC CHEMICAL EXPOSITION
SAN FRANCISCO CIVIC AUDITORIUM
OCTOBER 21 - 25, INC. 1947



MODEL "A" —Completely automatic—extremely accurate weighing. Saves on "give away" material, labor and bag costs, thus paying for itself quickly. Machine capable of filling and closing 100-lb. bags at the rate of 15 per minute . . . needs one operator.

Bagpak

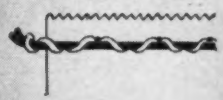
Sets the pace for Packaging!



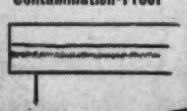
BAGPAKER® machines and methods provide low-cost packaging . . . speedy, modern packaging. The **BAGPAKER** operation gives you this unbeatable combination: tough **BAGPAK®** open-mouth multi-wall paper bags *plus* a "cushion-stitch" closure that's really contamination-proof, sift-proof and moisture-resistant.

A **BAGPAK** engineer will gladly show you how a **BAGPAKER** paves the way to lower packaging costs . . . better weighing, closing and handling. Write us; he'll call at your plant.

ALL BAGPAKERS MAKE THIS FAMOUS "CUSHION STITCH"



Taped closure is Moisture-Resistant—Sift-Proof—Contamination-Proof



MODEL "DA" (Portable and built to last)—One operator, filling and closing, can handle 2 to 4 100-lb. bags a minute . . . 6 to 12 a minute where filled bags are delivered to **BAGPAKER** conveyor (quickly adjustable for various bag sizes). Starting and stopping of sewing operation is automatic . . . no tape wasted.

BAGPAK INC

INTERNATIONAL PAPER PRODUCTS DIVISION
INTERNATIONAL PAPER COMPANY
220 East 42nd Street • New York 17, N.Y.

Branch Offices: Chicago, Boston, Pittsburgh, Philadelphia, Cleveland, St. Louis, Atlanta, Camden, Ark., Baltimore, Los Angeles, Syracuse, New Orleans.
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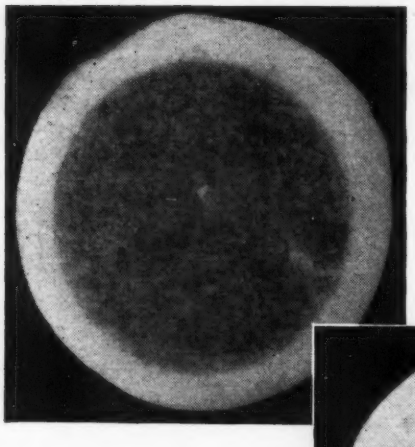
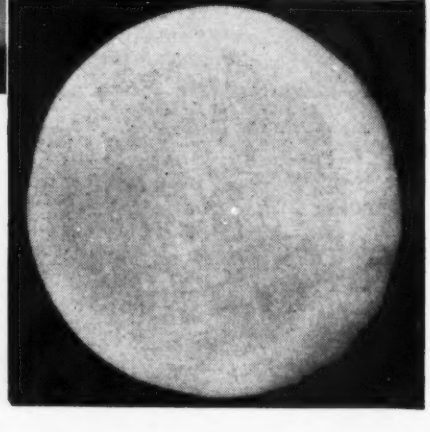
Sodium Benzoate is a Food Product

In addition to being U. S. P., Sodium Benzoate produced by Tennessee Products & Chemical Corporation is given the *pure milk sediment test* in order to assure absolute cleanliness and highest purity. *Examine these actual photographs:*



LEFT — *Sediment from ordinary U. S. P. Sodium Benzoate.*



RIGHT — *Sediment from Tennessee Products & Chemical Corp., U. S. P. Sodium Benzoate.*

If you are interesed in high purity along with the best of service, specify *Tennessee Products Sodium Benzoate.* Available in both flake and powdered form.

TENNESSEE PRODUCTS & CHEMICAL CORP.

General Office: Nashville, Tenn.

EASTERN SALES OFFICE: 350 FIFTH AVENUE, NEW YORK, 10, N. Y.

ment of benzyl chloride in nickel tank cars.

Section 250A has been added as follows:

(a) Benzyl bromide (bromotoluene) must be packed in specification containers as follows:
(b) Spec. 15A, 15B, or 15C.—Wooden boxes, with inside containers which must be: Glass bottles, not over 5 pints capacity each, closed by means of screw caps which are resistant to action of the contents; bottles must be packed in metal cans having slip-on or friction closure; cans must be cushioned in outside boxes with incombustible material.

The purpose of this amendment is to provide for the transportation of this commodity which has not heretofore been shipped commercially.

Section 252B has been amended by the following addition:

(a) Bromine trifluoride must be packed in specification containers as follows:
(b) Spec. 3A1800, 3E1800, 3B240, or 4B240.—Cylinders.

The purpose of this amendment is to provide for the transportation of this commodity which has not heretofore been shipped commercially.

Section 268 (d)(2), (d)(3) have been amended as follows:

(d)(2) Spec. 1D.—Boxed glass carboys of not over 6.5 gallons nominal capacity; authorized only for acid not over 1.43 specific gravity (43.61° Baume). Means shall be provided so that accumulated pressure in bottle shall not exceed 10 pounds per square inch gage at 130° F. or shall vent at a pressure not to exceed 10 pounds per square inch gage.
(d)(3) Cushioning for carboys must be incombustible mineral material, elastic wood strips, natural cork blocks or rubber blocks. Other materials may be used if approved by the Bureau of Explosives. The use of hay, excelsior, loose ground cork, or similar materials, whether treated or untreated, is prohibited.

The reason for the amendment to Sec. 268 (d)(3) is to prevent the use of cushioning materials which may, under certain circumstances, dangerously heat when subjected to the action of nitric acid.

Sec. 269 (d) was amended similar to Sec. 268 (d)(3). The reason for this amendment is to prevent the use of cushioning materials which may, under certain circumstances dangerously heat when subjected to the action of perchloric acid.

Section 302 (f) has been amended by changing the present sub-paragraph (f) to read Section 302 (a). The following new sub-paragraph (f) to Section 302 has been added:

(f) (1) Inside non-refillable metal containers charged with a solu-

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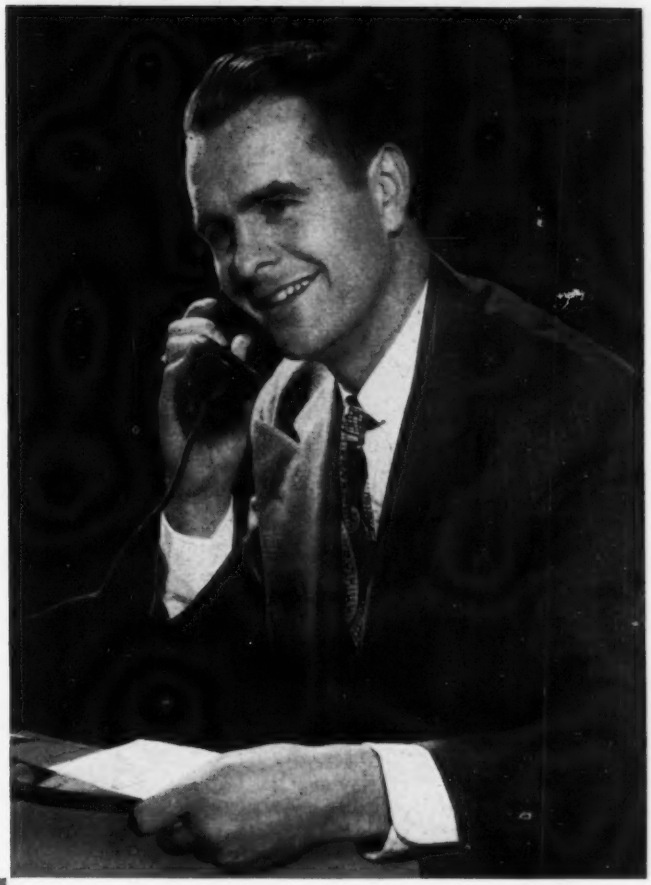

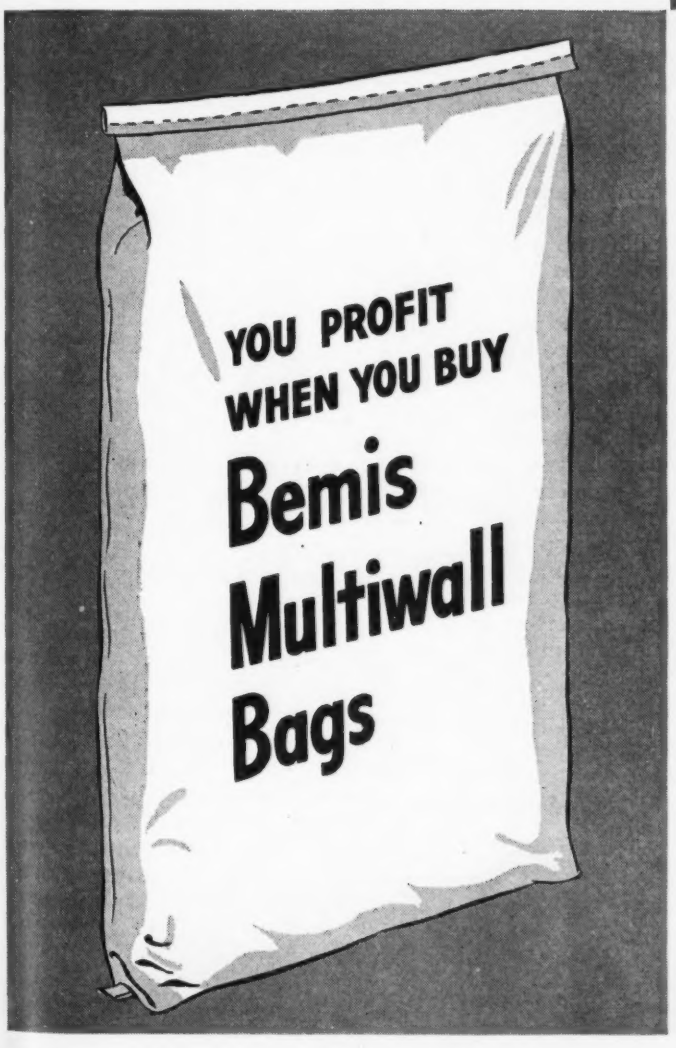

What Bemis facilities can do for you in service is as important as the top quality you get in Bemis Multiwall Bags.

Bemis' plants and sales offices are located to give you close-to-source contact.

Bemis multiwall specialists are available to help you with plant layout and bag filling, closing, and storage problems.

That's why it's good business to have "The Bemis Habit."

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AMMONIA ... the Invisible Provider

A BARRETT BASIC CHEMICAL

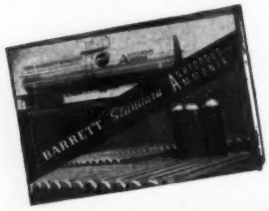
PURE AMMONIA (NH_3) is an invisible gas. But Ammonia's countless contributions to your way of life are visible all around you. Used as a gas, or as a liquid, or as a basic chemical from which other products are made, Ammonia enters into the production of almost everything you eat and wear and use.

Ammonia is the main source of plantfood Nitrogen, *the growth element* in the millions of tons of fertilizers which help American farms to yield a more abundant harvest of food, fiber and vegetable oil. As our chief refrigerant, Ammonia makes ice, quick-freezes or refrigerates perishable foods and air-conditions buildings.

Ammonia is used in the production of water-purifiers, sulfa-drugs, anti-malarials, vitamins and yeast. Derived from Ammonia are basic Nitrogen components of enamel ware, plastics, dyes, dry-cell batteries, industrial explosives, flame-proofing compounds, household cleaners, lacquers, certain types of rayon and other synthetic textile fibers.

Ammonia is a reagent employed in making rubber, high-octane gasoline, leather, industrial alcohol, alkalis, glass and paper. Ammonia serves as a solvent to extract certain metals from their ores. Disassociated Ammonia seals radio tubes and Ammonium fluoride etches glassware and frosts electric light bulbs. The bearings, crankshaft and piston rings of your automobile are hardened in an atmosphere of Ammonia.

Yet all of this is only the beginning. For Ammonia and its compounds and derivatives have literally hundreds of uses which help to provide better living for you and your family. To supply you with the everyday magic of this modern maker of miracles, Barrett, pioneer distributor of Ammonia, continues to expand its facilities and improve its service.



This interesting and helpful booklet is packed with useful information on Anhydrous Ammonia. You can obtain a copy without charge or obligation, by requesting it from the address below.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

Barrett

tion of materials and compressed gas or gases, which is non-poisonous and non-inflammable. Authorized as follows:

(2) Capacity not to exceed 30 cubic inches (16.6 fluid ounces.)
(3) Pressure in the container not to exceed 55 pounds per square inch absolute at 70° F.
(4) Liquid content of the material and gas must not completely fill the container at 130° F.
(5) Each completed container filled for shipment must be heated until content reached a minimum temperature of 130° F., without evidence of leakage, distortion or other defect.

The purpose of the addition of sub-paragraph (f) (1)—(5) is to provide exemption for shipments considered to be not sufficiently hazardous for labeling, etc., when packed in accordance therewith.

The table under Section 303 sub-paragraph (k) has been amended. These amendments cover a change pertaining to dichlorodifluoromethane, and an addition of tetrafluorethylene, inhibited. Shippers of these two commodities should consult the regulations.

Section 303 (p) (11) has been amended so that acetylene cylinders, except those authorized in Specification ICC-8 to be made of 4130X steel, need not be heat-treated or tested provided porous filling is found to be unchanged and intact.

Section 332 (a) (2) has been cancelled and Section 332 (a) (5) has been added. Section 332 (a) (5) reads as follows:

(a)(5) Metal drums of not over 20 gallons capacity constructed of not less than 20 gauge bodies with welded side seams and not less than 18 gauge heads double seamed to bodies. Steel sheets for bodies and heads shall be low carbon open hearth or electric steel. Openings over 2.3 inches diameter not permitted. Flanges shall be welded or riveted and soldered, or pressed in and soldered, to drums. Closures to be of the threaded plug or cap type and to be gas tight but may be equipped with suitable venting device. SHIPMENTS ARE AUTHORIZED FOR INTRASTATE TRANSPORTATION BY PRIVATE AND QUALIFIED CONTRACT CARRIERS BY MOTOR VEHICLE ONLY.

The purpose of these two amendments is to provide for the transportation of hydrocyanic acid for a specific purpose in containers which, after a lengthy experience record, have proved adequate and safe.

Amendments were also made to the specifications relating to the ICC 3A cylinder, ICC 4D cylinder, ICC 23G fiber container and ICC 42E aluminum drum. References to these changes may be found in the Interstate Commerce Commission Regulations for the Transportation of Dangerous Articles which now carry these amendments.

PROMPT DELIVERY

HERCULES *Aero*

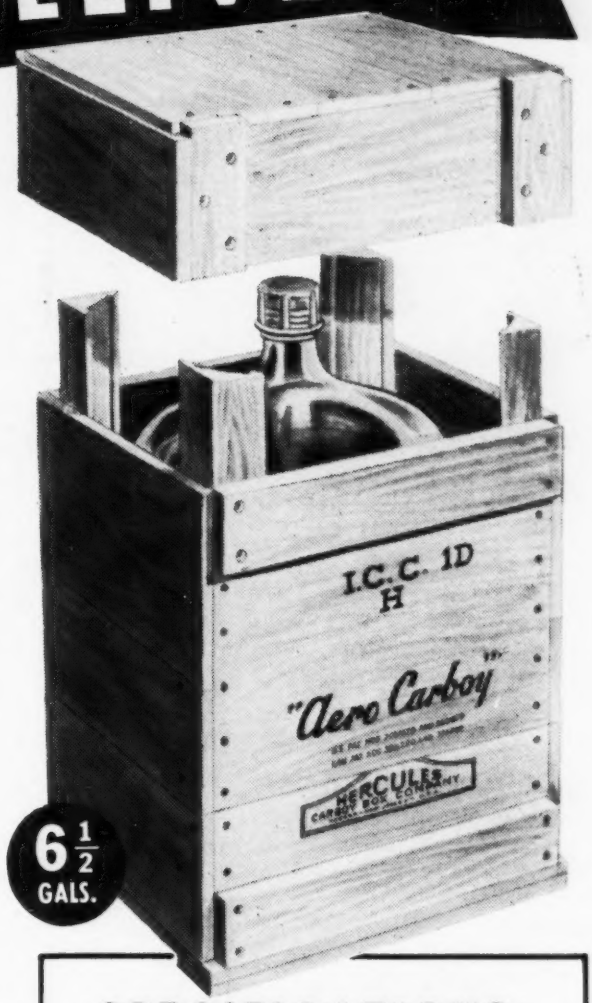
(RUBBER CUSHIONED)

CARBOY BOXES

6½ gals. normal capacity (7 gals. overflow). **Built to withstand an internal pressure of 10 lbs., this new rubber cushioned, completely enclosed, wooden carboy box complies with I.C.C. for transportation of the 3 principal mineral acids, Hydrochloric, Sulphuric, Nitric. Specific application should be made for other uses.**

These Features:

1. Flat cover—no protruding neck—enables boxes to be piled one on top of another for convenient storage. (See illustration at left.)
2. Corner posts provide a convenient handle so that one man can handle carboy. (See illustration at left.)
3. Smaller size and lighter weight makes for easier handling and shipping.



SPECIFICATIONS:

BOX SIZE: 13¾"x13¾"x22" Including Hood (I.D.)

WEIGHT: App. 26 lbs. (Box); App. 14 lbs. (Bottle)

CARBOY: 6½ gals. norm. cap. (7 gals. overflow)

COMPLIES WITH CLASSIFICATION I.C.C. 1-D

Other HERCULES *Aero* TYPE RUBBER CUSHIONED CARBOY BOXES Comply with Classification I.C.C. 1-A

5 GALS.

SPECIFICATIONS

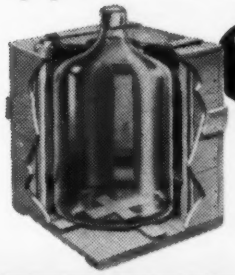
SIZE: 12½"x12½"x17¼" (I.D.)

WEIGHT: Approx. 23 lbs. without bottle

CARBOY: 5 gallons or 42 pints

STYLE: No. 6

Also available with hinged top and in 1, 2, 3 gals.



13 GALS.

SPECIFICATIONS

Size: 17½"x17½"x22" (I.D.)

WEIGHT: Approx. 45 lbs. without bottle

CARBOY: 13 gallons

STYLE: No. 15

NATIONAL BOX & LUMBER COMPANY

HOME OF HERCULES CARBOY BOXES • NEWARK 5, NEW JERSEY

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PUZZLE:

Station Scene, 1957. Find the man who is getting a steady income from U.S. Savings Bonds. He was smart enough to start buying, back in 1947.

Of all the ways of saving up a tidy sum of money, one of the *easiest* and *safest* ways is to invest your money in U. S. Bonds.

You can buy Bonds either through the Payroll Savings Plan at your place of business—or if the Payroll Plan is not available to you, but you *do* have a checking account, through the Bond-a-Month Plan at your local bank.

Both ways repay you $4 for every $3 you save, by the time your Bonds mature. Choose the sum you can afford from the chart on the right. Start saving today!

Save each week	AND YOU WILL HAVE		
	In 1 Year	In 5 Years	In 10 Years
$2.50	$130.00	$668.97	$1,440.84
3.75	195.00	1,004.20	2,163.45
7.50	390.00	2,009.02	4,329.02
12.50	650.00	3,348.95	7,217.20
18.75	975.00	5,024.24	10,828.74

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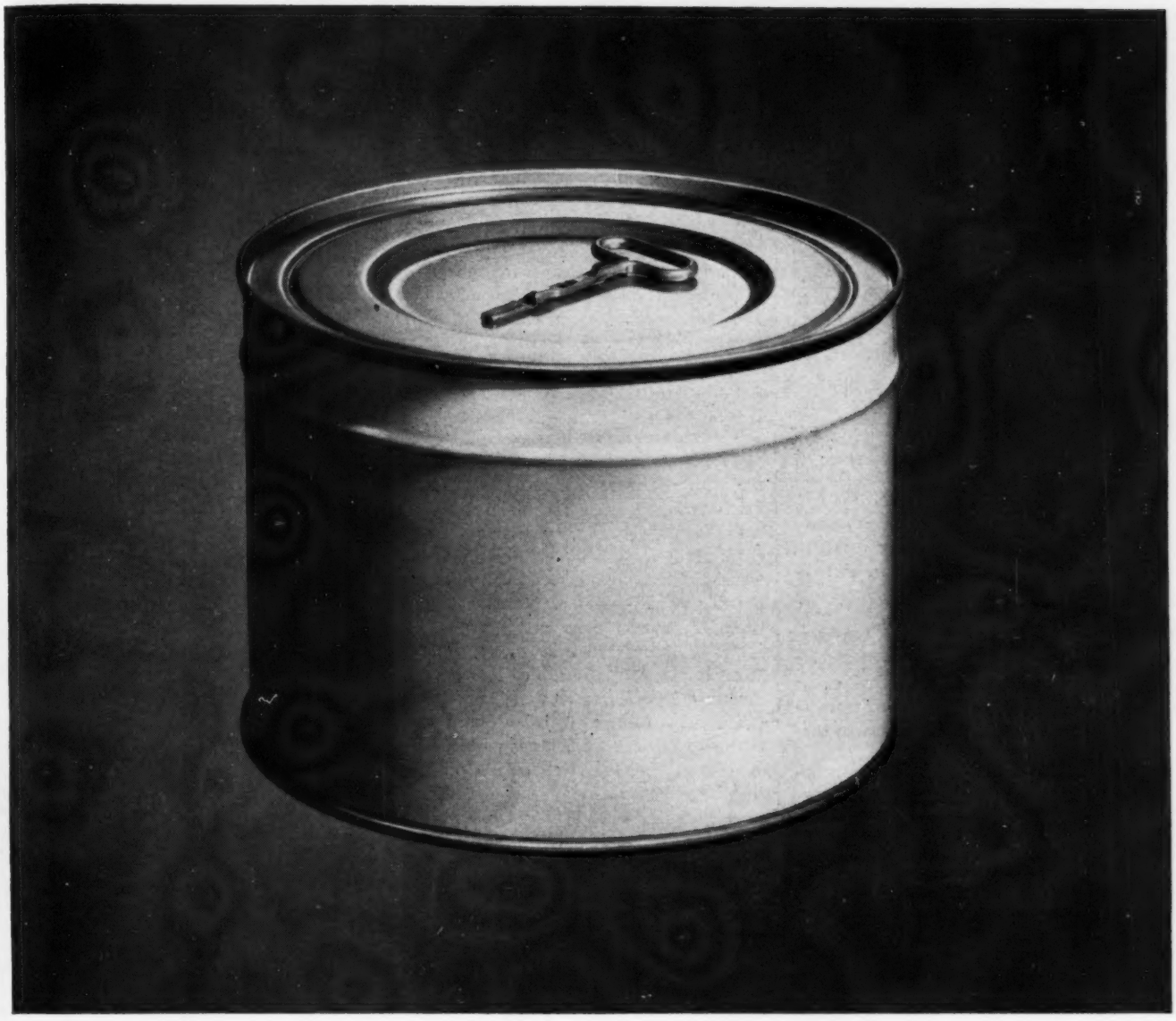


THE VACUUM COFFEE CAN: a 2-edged business tool

A little more than twenty years ago Canco made the first practical containers for vacuum-packing coffee.

Since that time, the vacuum-packed coffee business has increased thirteen fold.

It is easy to see why.

For the vacuum can brought the incomparable flavor and aroma of roaster-fresh coffee to millions who had never enjoyed such a pleasure before.

And this new pleasure in drinking coffee created a business opportunity for roasters who were alert and put their coffee in the now-famous vacuum can.

Local brands became national brands. Business increased many times over. And as volume multiplied itself, so too did profits.

But roasters using the vacuum can found it a business tool with a second edge, too.

For consumer satisfaction expressed itself in good will towards the roaster . . . loyalty to his brand name . . . and a high reputation throughout the trade.

Truly, the vacuum can for coffee bears out the statement that people who do business with Canco *profit*.

And why not? At their disposal they have both creative research and mechanical know-how in every phase of the packaging business.

For 46 years American Can Company has been improving containers and inventing new ones.

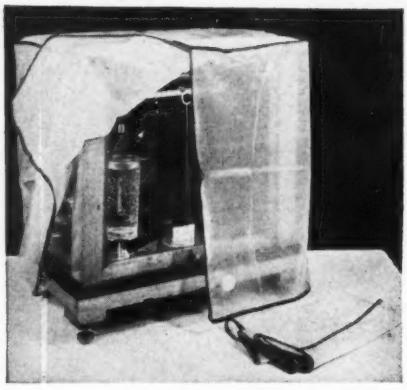
And while these achievements make an impressive list, the point is this: These achievements are evidence that we are experts in solving container problems.

The "Canco" solution will increase *your* business and *your* profits.

American Can Company CANCO NEW YORK · CHICAGO · SAN FRANCISCO

LABORATORY EQUIPMENT

INSTRUMENT COVERS



Transparent plastic covers for laboratory equipment afford protection against dust, dirt, and spilled liquids, while permitting observation of the covered instrument.

Made of semi-transparent, flexible, non-hardening material, these covers are machine sewn with black basting. Standard covers for ph meters, scales, and balances are in stock; special covers in any size can be supplied promptly.

PARTIAL LIST OF STANDARD COVERS

C-851	Balance, 17½ x 10½ x 16 H	ea. 3.00
C-852	Balance, 17½ x 10½ x 19 H	ea. 3.00
C-853	Balance, 18 x 10 x 17 H	ea. 3.00
C-854	Balance, 18 x 10 x 21 H	ea. 3.00
C-860	Macbeth ph Meter	ea. 1.00
C-862	Beckman ph Meter "M"	ea. 1.10
C-864	Beckman ph Meter "G"	ea. 1.00
C-866	Coleman ph Meter	ea. 1.00
C-871	Harvard Scales	ea. 1.50

Prices on other standard equipment on request.

BALANCE ILLUMINATOR

B-918

Balance Illuminator in electro-polished Stainless Steel case. Has 14 inch fluorescent tube, producing cool, glareless light. Rests directly on top of Balance and gives a concentration of light, illuminating beam, index plate, and pointer. Overall width is 16 inches. Supplied complete with tube, switch, cord and plug, for use on 110 volt 50-60 cycle A. C. only. **Each $16.50**

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LABORATORY NOTEBOOK

Powder Camera

A new high-intensity, high-resolution powder camera for X-ray diffraction work incorporates a new slit system which produces remarkably clean film patterns and reduces exposure time.

The new camera has precise collimator and beam tube alignment, light-tight cover design, and universal saddle (mount) which adapts the camera for use on existing types of X-ray diffraction apparatus.

This advanced modern assembly employs new track having rectangular profile with reference and bearing surfaces hard chrome plated to minimize wear and aid in precise repositioning. Mechanical design facilitates rapid vertical translation and pivoting of track, making possible quick and easy camera alignment. A synchronous drive motor (1 rpm) is incorporated in the assembly. A separable cord is furnished for connection to the power outlet.

The new camera will be useful for analysis work in such fields as metallurgy, mineralogy, geology, ceramics, cement chemistry, drugs, food, dairy products, petroleum products, paint, plastics, rubber, soap, cosmetics, water purification and sewage disposal. It is available from North American Philips Co., Inc., 100 East 42nd St., N. Y.

Standard Hydrocarbon Samples

Seven new NBS standard samples of hydrocarbons recently announced by the National Bureau of Standards bring to 119 the total of these compounds now available for calibrating analytical instruments and apparatus in the research development, and analytical laboratories of the petroleum, rubber, chemical, and allied industries. Since 1944, when the first of these NBS standard samples of hydrocarbons were made available, 100 additional compounds have been prepared through a cooperative undertaking of the Bureau and the American Petroleum Institute.

The seven new compounds are as follows:

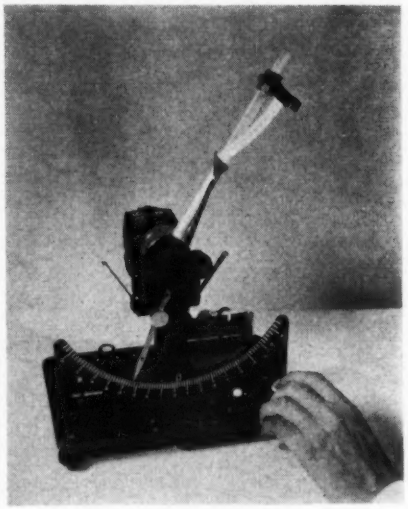
NBS sample number[a]	*Compound*	*Amount of impurity*[b] *Mole percent*	*Volume per sample*[c] *ml (liquid)*	*Price per sample*
253-5S	2,2,4-Trimethylhexane	0.30 ±0.20	5	$35.00
542-5S	2,3,3-Trimethylhexane	.13 ± .06	5	35.00
255-5S	2,3,5-Trimethylhexane	(.30 ± .20)[d]	5	35.00
517-5S	n-Butylcyclopentane	.034± .025	5	35.00
519-5S	1-Hexene	.14 ± .08	5	35.00
527-5S	Trans-2-Hexene	.17 ± .11	5	35.00
538-5S	2-Ethyl-1-butene	.10 ± .04	5	35.00

[a] The designation "-5S" following the sample number indicates a sample of 5 ml sealed "in vacuum" in a special Pyrex glass ampoule with internal "break-off" tip.
[b] The purity has been evaluated from measurements of freezing points, as described in J. Research NBS 35, 355 (1945) RP1676, unless otherwise indicated.
[c] Tolerance approximately ±10 percent.
[d] Estimated by analogy with isomers subjected to similar purification.

Instructions for transferring standard samples of hydrocarbons "in vacuum" are available on request. A complete list of NBS standard samples of hydrocarbons, together with instructions for ordering, may also be obtained from the National Bureau of Standards, Washington 25, D. C.

Stiffness Tester

A new motor-driven stiffness tester has been designed for rapid, accurate tests on finishings. The tester measures the stiffness, or absence of it, of practically any thin flexible sheet material. Its capacity is from light tissue paper or thin cloth up to the heaviest single



sheet boxboards in common use, and it can also measure such product finishings as varnish, paste, lacquer, glue, and wax.

More convenient than hand-operated instruments, this tester has a balanced pointer which pivots in jewel bearings, and moves parallel to a sine scale mounted on the base. It is loaded below the center with weights of 5, 25, 50 or 200 grams, fastened 1, 2, or 4 inches from the pivots. The arm carrying the sample being tested is moved by a small-geared synchronous motor which is controlled by a reversing switch on the base.

To make a test a sample is first cut

The accuracy and versatility of many pH instruments
are limited by the electrode system – *BUT NOT BECKMAN EQUIPMENT!*

...THE INDUSTRY'S MOST COMPLETE LINE OF MODERN pH ELECTRODES IS AVAILABLE FOR USE WITH BECKMAN pH INSTRUMENTS

REMEMBER THIS important fact about modern pH equipment—glass electrode pH instruments are the most advanced and efficient type of pH equipment obtainable. *But no glass electrode instrument is better than the versatility, accuracy and dependability of the electrode assemblies available for use with it.*

And that is another of the many vital advantages that are yours when you select BECKMAN pH Instruments—for Beckman, *pioneer of modern glass electrode pH equipment*, not only provides the finest and most advanced pH instruments, but also the industry's most complete line of electrodes for use with these instruments.

Illustrated below are only a few of the more than 90 different types of interchangeable Beckman pH Electrodes that assure maximum accuracy, convenience and wide-range adaptability to users of Beckman pH Meters—the pH instruments that are the recognized standard of the industry.

No matter what *your* pH problem, there is a Beckman pH Instrument and a Beckman Glass Electrode assembly to meet your exact requirements for both industrial and research applications. So why restrict your operations with anything less than the *complete* pH facilities provided by Beckman?

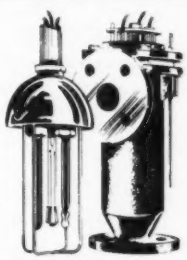
HIGH pH GLASS ELECTRODES. Pioneered by Beckman, these glass electrodes permit accurate measurement of high pH solutions with negligible error *even in the presence of sodium ions.* Ideal for use on detergents, soaps and many other applications where regular glass electrodes are useless.

HIGH TEMPERATURE GLASS ELECTRODES. Another development pioneered by Beckman, these electrodes can be used directly in high temperature process solutions to 100° C. (212° F.) without damage. Eliminates special sampling devices and greatly simplifies control of hot processing solutions.

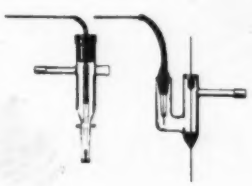
RUGGED DUTY GLASS ELECTRODES. Still another Beckman development, these electrodes are specially designed for direct immersion in tanks and flow lines where abrasion is severe (paper pulps, ore slurries, etc.). Not only abrasion resistant, but also withstand more than 100 lbs. pressure on immersion end.

PENETRATION TYPE GLASS ELECTRODES. The pointed application end greatly simplifies direct pH measurements of cheeses, fish, fruits and similar semi-solids where penetration of outer surface is desired for internal pH measurements.

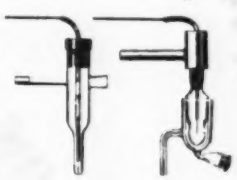
SURFACE TYPE GLASS ELECTRODES. On these Beckman electrodes the application end is nearly flat in order to simplify pH measurements on skin, hides and moist surfaces of materials where pH measurements of outer surfaces are desired.



IMMERSION AND FLOW TYPE ASSEMBLIES. Can be placed directly in flow lines, vats, tanks, etc., to permit direct and continuous pH measurements on process solutions. Far simpler, quicker and more accurate than sampling devices. Can be used with various types of Beckman electrodes.



MICRO GLASS ELECTRODES. One of dozens of specialized Beckman pH electrodes for science and laboratory investigations. This type permits quick, convenient and accurate pH measurements on samples of less than one drop.



HYPODERMIC GLASS ELECTRODES. One of many specialized Beckman pH electrodes for medical use. In this type, 0.5 ml blood samples can be injected from hypodermic needle through membrane with minimum exposure to air. Other types are also available.

THE ABOVE ARE ONLY TYPICAL **of the wide selection of glass electrodes available for use with Beckman pH Instruments . . . one more reason why Beckman pH Instruments are recognized throughout the world for their dependability, accuracy and versatility. *Beckman Instruments, National Technical Laboratories, South Pasadena , Calif.***

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Bulletin No. 1440 containing complete details of the new motor-operated stiffness tester is available on request to W. & L. E. Gurley, Troy, New York.

Faster Dust-Counter

The M.S.A. Dust-Vue Microprojector, designed to simplify the determination of numerical concentrations of impinger and precipitator dust samples, is a new instrument which eliminates time-consuming direct microscope-counting of dust particles. The instrument projects the microscopic field image on a ruled, translucent screen, 250 mm. x 200 mm., with a magnification of 1000 diameters. This greatly enlarged image makes dust-counting faster, easier, and more accurate—enables dust particles to be distinguished from pits and bubbles in the glass of the cell—and permits more concentrated samples to be counted without secondary dilution.

Readily portable and sturdily built, the M.S.A. Microprojector can be conveniently used for field as well as laboratory work. Light is provided by a dependable tungsten-mercury arc lamp.

Any standard fork-stand type microscope can be used. It is placed directly under the Microprojector screen, thereby simplifying aligning and focusing, and making remote controls unnecessary. A removable screen shield permits light-room counting.

For further information write for Bulletin No. CT-7 to Mine Safety Appliances Company, Braddock, Thomas, and Meade Sts., Pittsburgh 8, Pa.

Time-Saver for Medical Department

A new technique is of special interest to medical departments of industrial companies that give medical examinations to a large number of employees. It is a process by which both albumin and sugar tests can be made on one 5-drop portion of urine.

The necessary apparatus and reagents are available, in a small plastic rack for office and laboratory use, from Cargille Scientific, Inc., 118 Liberty St., New York 6, N. Y.

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A company-sponsored insurance program provides for life insurance, hospitalization and surgical benefits, non-occupational sickness and accident indemnity benefits.

The success of International's company-employee relations is reflected in the Corporation's continued leadership and growth in the phosphate mining industry. A growth that can be measured in increased tonnages of essential, high-grade phosphates which are now available for industry and agriculture throughout the world.

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INDUSTRY'S BOOKSHELF

New Fibers

THE NEW FIBERS by *Joseph V. Sherman* and *Signe L. Sherman*. D. Van Nostrand Co., 1946. 537 pp.; $5.00. Reviewed by F. H. Swezey.

THIS EXCELLENT book has a broader scope than that indicated by the title; improved rayons and chemical textile treatments are also included. The entire subject is highlighted by the authors' statement: ". . . it is safe to predict that the time will come when most of the fibers used will be either man-made fibers or man-improved fibers. In this sense, the new fibers of today will probably be the standard fibers of tomorrow."

Full details concerning the manufacture and properties of glass, nylon and the several new protein and vinyl fibers are given. New cellulosic yarns, the improved viscose and acetate rayons recently developed, and a number of miscellaneous fibers, are also described. An extensive patent bibliography is a valuable part of the book.

The book is attractively presented, is easy to read, and has many charts and illustrations. A good balance is maintained in the space devoted to the description of the various fibers. It is evident that the authors have used considerable care in the selection of data; the treatment is thorough and comprehensive. The information given is soundly based. There are adequate references given with each chapter to which the reader can turn for more detail, although the essential points are covered in the text.

The information given concerning fiber properties, uses and markets, together with the discussion of research and future trends, make this book indispensable to those working with and interested in new yarns. The naming of established, as well as the potential, applications of these products should be useful to those engaged in research on new fibers. This book provides a volume for current reference and portends the promising future that lies ahead for this industry.

Portland Cement

THE CHEMISTRY OF PORTLAND CEMENT, by *Robert Herman Bogue*. Reinhold Publishing Corp., 1947. 572 pp.; $10.00. Reviewed by Percy E. Landolt.

TO ANYONE familiar with Portland Cement technology a contribution of Dr. Bogue would always be appreciated for its thoroughness and classical quality. In addition, there is a wealth of material on silicate chemistry that should be invaluable to others outside of the cement industry, for example, those interested in ceramic research and technology.

The major portion of the book is devoted to phase equilibra studies and considerations of the multiplicity of lime-silica-alumina-iron compounds as well as inter-related compounds such as with the alkalies. The contribution to lithium chemistry is unique and valuable.

While the use of the expression "heat treatment" is understandable, it is a rather unusual one in view of its generally accepted use in metallurgical work. Perhaps the expression "Thermal considerations in manufacture" would have been better advised.

Inasmuch as the text is concerned with chemical considerations of the subject matter, only very limited consideration is given to particle size factors. Because particle size considerations in cement manufacture and use have assumed so much importance, more detailed references could have been included for the benefit of the student and investigator in cement technology. The brief references to analytical methods in general are fully warranted in a text of this character.

Many valuable diagrams are included to illustrate the text, for which the author is to be complimented, but the publisher could have added usefulness as well as attractiveness in the presentation of the text by having the legend on these diagrams carefully set up in clear bold printed type.

References given in each chapter are clear and quite replete.

This valuable text should be a must in the reference library of all who are interested in cement chemistry and technology.

Injection Molding

INJECTION MOLDING OF PLASTICS, by *Islyn Thomas*. Rheinhold Publishing Corporation, N. Y., 1947. 542 pages; $10.00. Reviewed by R. P. Piperoux, Chief Development Engineer, Celanese Corporation.

THE AUTHOR begins his text with a full history of the injection molding process and injection molding machines from their inception to the present time. Descriptions of the machines are supplemented with illustrations of all commercial American machines and a considerable number of foreign ones.

A chapter on materials covering all injection molding materials in common use today defines for each its best application. In two later chapters a full list of properties of each, classified separately under each specific property permits the rapid selection of the most logical plastic for the particular application under consideration.

The matter of plant layout, material storage and handling, molding room operations, organization of departments, handling of machines as regards temperatures and operation cycles of value to the engineer, manufacturer or foreman receives full coverage together with description of the behavior and peculiarities under injection operations of each specific plastic.

The "dos" and "don'ts" of the design of plastic pieces, the use and design of inserts, sprues and runners, ejection of finished pieces is gone into in detail.

The chapter on mold design is prolific in useful data, covering machining and hobbing with notes on types of steel and protective plating. A very useful series of diagrams shows the detail dimensions of heads of practically all injection machines of American manufacture enabling the mold designer to fit his mold and adapters interchangeably to various machines.

A great deal more is covered than is given in this short review and the book seems to have covered the field extremely well. It appears to this reviewer that this book could well be used as a text in a course on injection molding. Supplemented by actual problems under the guidance of competent instructor such a course would enable the student engineer, manufacturer or injection shop foreman to cope with practically any problem which might come up in the course of his work.

Other Publications

CUTTING TOMORROW'S COSTS, a collection of papers on product research, product design, process research and planning and coordination. Production series number 168, American Management Assn., 330 West 42nd St., New York 18, N. Y. $1.00.

WATER ANALYSIS, a discussion of methods which have been adopted by Solvay Laboratories for the analysis of water for municipal and industrial use. The booklet is not a general reference work. Bulletin No. 11, Solvay Sales Corp., 40 Rector St., New York 6, N. Y. No charge.

UNITED STATES GOVERNMENT MANUAL — 1947, second edition covers the creation and organization, functions, and activities of all branches of the government. Names and titles of administrative officials are also included, and statements on public international organizations. Government Printing Office, Washington, D. C. $1.00.

Reports recently released by the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., include: ALKALI DEGREASING SOLUTIONS: (PB-49262) photostat, $3; microfilm, $1; 36 pages. POLYVINYL CHLORIDE PRODUCTION AT BURGHAUSEN AND LUDWIGSHAFEN: (PB-44674) photostat, $3; microfilm, $1; 32 pages. DEVELOPMENTS IN PURE AND APPLIED MICROBIOLOGY IN GERMANY: (PB-23650) photostat, $4; microfilm, $1; mimeographed, $1.50. ORGANIC PROTECTIVE COATINGS: (PB-6642) photostat, $5; microfilm, $1; 66 pages including illustrations. INVESTIGATION OF SYNTHETIC RESINS USED IN THE GERMAN SURFACE COATING INDUSTRY: (PB-52858) microfilm, $3; photostat, $10; 141 pages. SYNTHETIC VARNISH RESINS AND MOULDING POWDERS AT CHEMISCHE WORKE ALBERT, WIESBADEN: (PB-58269) microfilm, $1; photostat, $4; 47 pages. INTERVIEW WITH PROFESSOR OTTO BAYER, a report on the Farben development: (PB-45246) microfilm, $1; photostat, $1; 7 pages. POLYURETHANES, DR. O. BAYER: (PB-46961) microfilm, $1; photostat, $2; 21 pages.

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"Effect of Light Magnesium Oxides on Neoprene Scorching". 9 pgs., Bul. No. 47-1, General Magnesite and Magnesia Co.

Chemicals Catalog B296
List of CP, USP and technical reagents, indicators, stains and dyes, culture media and solutions for laboratory use. 96 pgs., Catalog R, Central Scientific Co.

Sanitizing Agent B297
"Kill Bacteria with Pittcide". 24 pgs., Form B-751, Columbia Chemical Div., Pittsburgh Plate Glass Co.

Flameproofing Compounds B298
"Physical Properties of Permaproof 200 Compounds". 4 pgs., The B. F. Goodrich Co.

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"Dresinol, A Selective Plugging Agent for Secondary Recovery by Water Flooding". 12 pgs., Hercules Powder Co.

Price List B300
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Synthetic Organics B301
"The Physical Properties of Synthetic Organic Chemicals". 11 pgs., Form 6136, Carbide and Carbon Chemicals Corp.

Bactericide B302
"Safeguard Milk Production with Pittcide". 16 pgs., Form B-752, Columbia Chemicals Div., Pittsburgh Plate Glass Co.

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"Orbiscide Rotenone Resins for the Manufacture of Agricultural Sprays, Household Insecticides, and Specialty Rotenone Products". 6 pgs., Insecticide Sales Div., Orbis Products Corp.

Fatty Acids B304
"The Handling, Sampling and Testing of Fatty Acids". 5 pgs., Armour Chemical Div., Armour & Co.

Equipment

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"Hyster 40". 15 pgs., Hyster Co.

Humidifiers G418
"Maid-O'-Mist 'Atomick' Humidifiers for Commercial and Industrial Applications". 3 pgs., Maid-O'-Mist, Inc.

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"Tubular Air Heater". 16 pgs., The Babcock and Wilcox Co.

Powder Filling Machinery G420
"Powder Filling Machinery for Filling and Capping Jars, Cans, Boxes, Tubes, Bags". 6 pgs., Harold W. Baker Co.

Cutting of Stainless Steels G421
"Flux-Injection Cutting of Stainless Steels". 12 pgs., Air Reduction.

Electric Heating Mantles G422
"Glas-Col Electric Heating Mantles". 15 pgs., Bul. No. 3, Glas-Col Apparatus Co.

Packaging G423
"How to Engineer Corrugated Shipping Boxes". Little Packaging Library No. 8, The Hinde & Dauch Paper Co.

Dryer G424
"The Link-Belt Multi-Louvre Dryer". 12 pgs., Book No. 2209, Link-Belt Co.

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"New Flexoveyor". 4 pgs., Bul. No. 100, E. C. Horne Machinery Co.

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"Model 21-102 Mass Spectrometer". 20 pgs., Consolidated Engineering Corp.

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"Coleman Junior Spectrophotometer". 8 pgs., Harshaw Scientific Div., The Harshaw Chemical Co.

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"Shafer Valve Control". 3 pgs., Shafer Valve Co., Inc.

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"The Chemical Consultant and Your Business". Foster D. Snell, Inc.

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"Textolite Laminated Plastics". 64 pgs., General Electric.

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"Specifications for Rewinding Motors with Silicone Insulation". 2 pgs., Silicone Notes No. B-30-1, Dow Corning Corp.

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"E-M Synchronizer". 15 pgs., Vol. 8, No. 2, Electric Machinery Mfg. Co.

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"Corrosion Resistant Materials and Equipment". 15 pgs., Bul. K, U. S. Stoneware Co.

Oscillograph G452
"Du Mont Type 247-A Cathode-Ray Oscillograph". 5 pgs., Catalog No. 1288-A, Allen B. DuMont Laboratories, Inc.

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"Theory of the Rotameter". 24 pgs., Catalog Sec. 98-Y, Fischer & Porter Co.

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"Cochrane Direct Contact Open Heaters". 21 pgs., Publ. 4091, Cochrane Corp.

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"Is There POISON in Your Corrosion Resisting Alloys?". 4 pgs., Bul. No. M-5, The Duriron Co., Inc.

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"Expansion Joints and Flexible Connectors". 60 pgs., Catalog 47, Zallea Brothers and Johnson.

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"Magnetic Screen Filter Separator", Bul. No. 120-B, Stearns Magnetic Mfg. Co.

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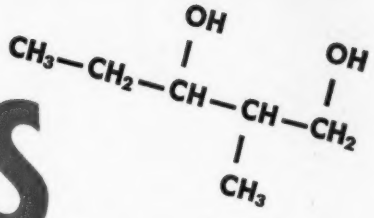

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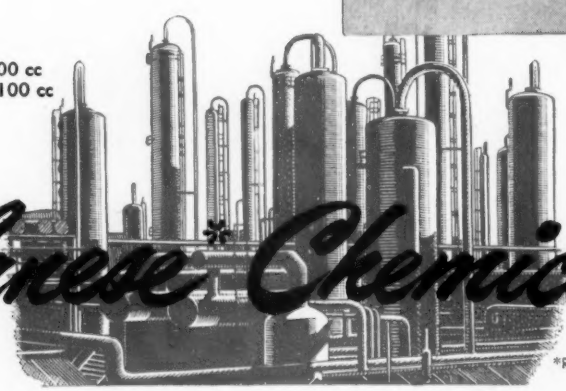
WATER SOLUBILITY IN @ 20° C.	250 cc in 100 cc

METHYLAL

A Celanese Chemical*

Methylal (dimethoxy-methane) is now available in commercial quantities from Celanese. This chemical promises to be of great value to those industries requiring a low boiling liquid of extremely high solvent power. As a chemical intermediate in organic synthesis it can be used to provide a controlled source of anhydrous formaldehyde and menthanol by hydrolysis under acid conditions. It has relatively high water solubility and is readily salted out of solution. Call on Celanese for technical assistance and information regarding the applications of Methylal in your field.



Celanese Chemicals*

*Reg. U. S. Pat. Off.

ALDEHYDES • ALCOHOLS • ACIDS • SOLVENTS • INTERMEDIATES • PLASTICIZERS • KETONES

NEWS OF THE MONTH

Establish Ruling For Nitrogen Export

Procedure to be followed in exporting nitrogenous fertilizer materials to foreign countries from the United States has been established by the Office of Materials Distribution, Department of Commerce.

Provision has been made for an export symbol, CXN, for use on certified export orders of this material, up to the total of 57,860 tons of nitrogen which the United States is committed to sending overseas. This symbol will have the force and effect of a priority rating, so that orders bearing the symbol must be accepted and shipped by producers.

In order to assure equitable distribution among producers from the total export quota, the Government has put a limit on the rated orders each is required to accept. Unless otherwise directed by Office of Materials Distribution, no producer is required to accept orders calling for in excess of the following percentages of his 1946-47 production: ammonium sulphate, 9 per cent; ammonium nitrate, 16 per cent; ammonium phosphate, 42 per cent; all other nitrogenous solids, 4 per cent; all nitrogenous solutions, 2 per cent.

Chemical Dividends Register Sharp Gain

Publicly reported cash dividend payments by chemical corporations of the United States were up 25 per cent in the second quarter 1947 over the corresponding months of last year, the Department of Commerce reports.

Cash dividend payments by U. S. corporations in general showed an increase of 18 per cent in June compared with June, 1946. Some payments reported were: chemicals, June 1947, $50,700,000 compared with June, 1946, $43,100,000; oil refining, $96,300,000 and $72,400,000 respectively; textiles and leather, $16,100,000 and 11,000,000.

Chemical corporation dividends reported for the second quarter of this year were $87,800,000 compared with $70,300,000 for the same quarter, 1946.

Publicly reported cash dividends account for about 60 per cent of all cash dividends paid.

Need Industry's Help to Evaluate Data

Technical societies, trade associations and other private industry groups have been invited by the Office of Technical Services, Department of Commerce, to assist in appraising and evaluating an estimated 500,000 technical documents covering German war-time industrial technology.

While it has been the practice to publish abstracts of these reports and surveys as fast as they can be prepared, the OTS feels that this is not adequate in bringing all information to the attention of business men in this country.

It is planned to compile and publish a compendium of German war-time technology based on these documents, but the agency can do no more than coordinate the work involved.

American Potash Promotes Coons

Robert Coons, who joined American Potash last year as assistant to the president, recently named to the post of vice-president.

China Schedules Chemical Imports

Imports of industrial chemicals into China have been divided into categories of "essential," "partially essential," and chemicals not otherwise provided for, and quotas allotted from dollar exchange accordingly, this Government has been informed by Chinese authorities.

An allocation of $2,000,000 U. S. was made for chemical imports in the February-April period and on the basis of the division at that time it was projected that imports in the May-July months, for which $2,600,000 U. S. was allotted, would show the following division: at Shanghai, essential, $1,131,000; partially essential, $339,300; other, $791,700; at out-ports, total, $338,000.

Essential chemicals are: hydrochloric acid, sulfuric acid, anhydrous ammonia, bleaching powder (chloride of lime), calcium carbide, glycerine, chlorate of potash, phosphorous, potassium bichromate, soda ash, sodium bichromate, caustic soda sodium nitrate, and sulphur.

Welfare Plans Win Wider Acceptance

A recent survey of more than 15,000 manufacturing establishments made by the Bureau of Labor Statistics reveals that insurance, or health and pension plans, are now written into a large number of employer-employee agreements. This is particularly true of the chemical industry.

Of the 999 chemical concerns contacted 56 per cent had some form of insurance or pension plan. Of these, almost one half had life insurance, the next largest group carried health insurance, 13 per cent had retirement funds and 11 per cent had instituted other plans.

In the chemical industry the Pacific region showed the highest proportion of health-insurance arrangements while the Southwest led in life insurance. The lowest percentage of chemical establishments having insurance or pension plans were located in New England.

Fats and Oils Data Assured

Continued monthly reporting of statistics on fats and oils, oil bearing seeds or other materials, by the Census Bureau, is provided for by legislation passed in the expiring session of Congress. The action puts on a regular peace-time basis a reporting program authorized as a war measure.

The reports will cover, as in the past, monthly production, stocks and other data, on cottonseed, soybeans, flaxseeds, peanuts, corn germs, copra, sesame seed, babassu nuts and kernels, and other oilseeds, nuts and kernels.

Move to Standardize Antifreeze Specifications

The American Society for Testing Materials recently organized a new Technical Committee which will concern itself with problems pertaining to the standardization of automotive antifreezes.

Among the matters which the Committee plans to deal with are: standardization of various test methods for the examination and evaluation of antifreezes; investigation of the corrosive properties of antifreezes and additives; methods of checking automobile cooling systems at service stations; and the drafting of performance specifications.

Chairman of the group is H. R. Wolf, Research Laboratories Division, General Motors Corp. D. G. Zink, U. S. Industrial Chemicals, Inc., has been named vice-chairman of the Committee.

Chemical Company Half Year Earnings

Company	Net Income After Taxes 1947	1946
Air Reduction Co.	$2,926,640	$1,739,689
Atlas Powder Co.	1,017,261	
Blaw-Knox Co.	1,382,283	1,054,064
Lion Oil Co.	3,039,143	1,131,102
Freeport Sulphur Co.	1,407,988	2,001,843
Hercules Powder Co.	7,312,900	3,629,885
Heyden Chemical Corp.	1,387,502	1,845,974
Hooker Electrochemical Co.	1,098,996	
Mathieson Alkali Works	1,510,730	943,554
Monsanto Chemical Co.	9,275,133	6,185,234
National Lead Co.	6,479,049	5,069,455
Nopco Chemical Co.	325,335	390,469
St. Regis Paper Co.	7,696,147	5,563,603
Sterling Drug, Inc.	7,083,238	7,520,661
Sun Chemical Corp.	804,038	636,892
Union Carbide and Carbon Corp.	36,071,419	24,657,976
Victor Chemical Works	1,169,823	1,023,509

Natural Rubber Program Progresses

The joint U. S.-Latin American cooperative program for propagating a Western Hemisphere supply of natural rubber is past the nursery stage, according to Dr. E. W. Brandes, U. S. Department of Agriculture representative on the program.

About 29,000 acres of field plantings are now established in Government demonstration areas, or on coffee, banana and other plantations, and nearly 1,000 small farms. The program extends into Brazil, Colombia, Costa Rica, Guatemala, Haiti, Honduras, Mexico and Peru.

Cooper Advanced by Calco

H. B. H. Cooper, named assistant manager of the Development Dept., Calco Chemical Division, American Cyanamid Co. He is a graduate of Iowa State College.

COMPANIES

ATLAS POWDER CO. has established a Western district sales office for its Industrial Chemicals Department. The office is located at Los Angeles, in conjunction with other Atlas sales offices in the Title Guarantee Building, 411 W. Fifth St.

CALENDAR *of* EVENTS

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS, annual meeting, Congress Hotel, Chicago, Oct. 23-25.
AMERICAN GAS ASSOCIATION, annual convention, San Francisco, Sept. 29-Oct. 3.
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, Buffalo, Sept. 29-Oct. 1.
AMERICAN OIL CHEMISTS' SOCIETY, annual fall meeting, Edgewater Beach Hotel, Chicago, Oct. 20-22.
ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS, Shoreham Hotel, Washington, D. C., Oct. 20-23.
EXPOSITION OF CHEMICAL INDUSTRIES, Grand Central Palace, New York, Dec. 1-6.
NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION, Traymore Hotel, Atlantic City, week of Oct. 27.
NATIONAL METAL EXPOSITION & CONGRESS, International Amphitheatre, Chicago, Oct. 18-24.
NATIONAL WHOLESALE DRUGGISTS' ASSOCIATION, annual convention, Ambassador Hotel, Atlantic City, Oct. 18-23.
PACIFIC CHEMICAL EXPOSITION, San Francisco Civic Auditorium, San Francisco, Oct. 21-25.
PACKAGING MACHINERY MANUFACTURERS INSTITUTE, 15th annual meeting, Hotel Sheraton, Springfield, Mass., Oct. 6-7.
THE DRUG, CHEMICAL AND ALLIED TRADES SECTION, NEW YORK BOARD OF TRADE, INC., 57th annual meeting, Shawnee Inn, Shawnee-on-Delaware, Pa., Sept. 25-26.
THE ELECTROCHEMICAL SOCIETY, INC., Boston congress, Oct. 15-18.

HYGRADE FOOD PRODUCTS CORP. has formed a new division, HYGRADE LABORATORIES, INC., for the manufacture of bulk pharmaceuticals from animal glands and tissues. Norman Applezweig is the technical director of the project. The laboratories are located at 601 West 26th St., New York.

THE QUAKER CHEMICAL PRODUCTS

QUALITY CHEMICALS *in quantity!*

STANDARD HUNT'S CHEMICALS

POTASSIUM FERRICYANIDE

Color Granular

Versatile chemical with many uses in paper manufacture, synthetic rubber, calico printing, pigments, tempering of steel, photographic bleach and toners, mild oxidizing agent, analytical chemistry, and blue print coating.

K_3 Fe $(CN)_6$

Mol. Wgt.	329.18
Ferrous Salts	trace
Sulphates	0.009%
Chlorides	0.020%
Assay	99.0%
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Immediate shipments in commercial quantities.

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POTASSIUM METABISULPHITE

Granular $K_2S_2O_5$

Widely used as a preservative in beverages and foods, in photographic developers, dyeing and printing of textile fabrics, lithography and engraving preparations, and as a fine chemical reagent.

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Sharples Chemicals Inc., Philadelphia
Stauffer Chemical Co., New York
United Carbon Co., Charleston
Howards & Sons Ltd., Ilford, U.K.
Washington Chemical Co., Newcastle, U.K.
Bolidens Gruvaktiebolag, Stockholm, Sweden

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SOFTENERS
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EMULSIFIERS
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For the following suggested uses:
RUBBER VULCANIZER (Industrial & Engineering Chemistry, Jan. '47, "Vulcanization of GR-S with Halogen Compounds")
INSECTICIDE—Clothes Moth Control as a synergist and extender. (Paper read by Nicholas M. Molnar before N. A. I. D. M., Entomological tests conducted by independent laboratories)
Against mosquito larvae (Dept. of Agric. Bur. Ent. & Plant Quar. Pub. E-425, 1938; Ibid, E-585, 1943; Ibid, E-621, 1944)
Against corn earworm infection (Dept. of Agric. Bur. Ent. & Plant Quar. Pub. E-485, 1939)
MEDICINE—Particularly in veterinary medicine against cattle diseases. Spraying and dusting of cattle against insects. (Oregon Agric. Experimental Station Tech. Bulletin No. 7 and other references)
PYROTECHNICS—Ingredient in fireworks and smoke devices

Available in carload or less than carload quantities for prompt shipment.

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GRamercy 5-1030
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Acetic Acid—Acetate of Lime
Acetate of Soda
Acetone C. P.
Butyl Alcohol—Butyl Acetate
Methanol—Methyl Acetone
Methyl Acetate
Formaldehyde
Denatured Alcohol
Turpentine—Rosin
Benzol—Toluol—Xylol
Sodium Benzoate U. S. P.
Benzaldehyde { Technical- N. F. F. F. C.
Whiting
Magnesium Carbonate
Magnesium Oxide
Precipitated Chalk

Anti-Freeze—Methanol and Alcohol

CORP. *of* Conshohocken has begun the manufacture of polyethylene glycol esters. Surface active agents of the non-ionic type, they are used in the manufacture of pharmaceuticals, paper, paints, plastic articles, leathers, adhesives, and other articles.

THE WILMINGTON CHEMICAL CORP. has transferred its New York sales office to its main office at 1 South Heald St., Wilmington 2, Delaware.

THE AMERICAN PACIFIC INDUSTRIAL CORP. has opened offices at 70 East 45th St., New York City. The corporation is the domestic, as well as export, representative of several manufacturers.

HENDREY CHEMICAL CORP., INC., has been organized in Chicago to act as distributors and brokers of chemicals, chemical specialties and essential oils. The principals in this organization are Robert DeLamar, A. M. DeLamar and Waldersee B. Hendrey.

THE TOMS RIVER CHEMICAL CORP. has completed a new plant for the manufacture of fine chemicals and drugs at Pinewald, N. J. The unit consists of 10 acres and 3 buildings and was formerly owned by the Werne Plastics Corp. J. D. Green is the plant manager.

ARABOL MFG. CO., NEW YORK, manufacturer of adhesives, has leased a three-story building at 1950 Sixteenth St., San Francisco.

AMERICAN CYANAMID CO. plans a $1 million expansion program for its Fort Worth plant. The plans include additional processing building, storage tanks and other items needed in the manufacture of the fluid catalyst powder which is made at the facility.

ANGLO-IRANIAN OIL CO., LTD. and DISTILLERS CO., LTD. have concluded in principle an agreement to form a new company to engage in the manufacture of chemicals from petroleum in Great Britain. The capital required for the new development is estimated at around $20 million. It will be held equally by the two companies.

THE CHANDLER LABORATORIES has completed a new unit and laboratories in the Fern Rock section of Philadelphia. Flavors, extracts, emulsions, syrups and so forth will be manufactured.

NATIONAL CYLINDER GAS CO. has acquired the Independent Oxygen Co. of Houston, Texas.

HERCULES POWDER CO. has established a sales office at Detroit, Mich. Robert S. Glover, Jr., will be manager.

A new corporation, the GERM X LABORATORIES, INC., 77 Clay St., San Francisco, has been organized for the manufacture of a germicidal-antiseptic-deodorant combined in one product.

CRUCIBLE STEEL CO. of America has awarded Koppers Co., Inc., a contract for construction of new coke and by-product facilities at its Midland, Pa., plant at a price in excess of $6,000,000.

A battery of 63 coke ovens, coal and coke handling equipment, byproduct facilities, and a gas holder are included in the project.

The new coke ovens will add 600 tons daily to the Midland output of blast furnace coke, bringing the total output to 1800 tons. The new facilities are expected to be in operation by October, 1948.

Goss Assumes Pillsbury Post

Warren H. Goss, formerly with the Northern Regional Laboratory, U.S. D. A., has joined Pillsbury Mills, Inc., as associate director of research. He has conducted extensive research in soybean and oil processing.

HERCULES POWDER CO. will expand its operations at the Paper Makers Chemical department's Milwaukee, Wisconsin plant, 5228 N. Hopkins Street. The expansion involves the moving of casein blending and grinding operations from Chicago to the Milwaukee plant which heretofore manufactured rosin size and other chemicals for the paper industry. The Chicago plant is being closed.

THE ORTHO PHARMACEUTICAL CORP. is establishing a plant at High Wycombe, Buckinghamshire County, England, which will manufacture the complete line of obstetrical, gynecological and veterinary pharmaceuticals. It will be operated by ORTHO PHARMACEUTICAL, LTD., which recently opened a London office, and will serve Great Britain and its normal export markets including South Africa, China and India.

UNITED STATES RUBBER CO. will undertake operation of the 45,000-ton synthetic rubber plant at Borger, Texas, and will relinquish operation of the synthetic rubber plant at Los Angeles.

The unit, built and operated for the government by B. F. Goodrich Company, is located in the panhandle of Texas and is adjacent to a butadiene plant operated by Phillips Petroleum Co.

The name of the MERRITT-ENGINEERING AND SALES CO., INC., has been changed to MERRITT-MONSANTO CORP.

The organization, which manufactures veneer- and plywood-making machinery, became a part of Monsanto Chemical Company in 1944, when Monsanto acquired I. F. Laucks, Inc.

The MEFFORD CHEMICAL CO. having been operated as a partnership since 1917, has been incorporated. The ownership and management of the corporation remain the same as in the partnership.

GENERAL ANILINE & FILM CORP. has borrowed $15,500,000 from the Metro-

Fine Chemicals OF ASSURED QUALITY

E D W A L

2,4,6-Triaminotoluene 3HCl, Tech.

Props: Light tan to cream fine crystals. M. P. (free base) 119° C. Soluble in water, alcohol and acetone; insoluble in benzene.

Suggested Uses: Dyestuffs, resins, and pharmaceutical intermediates; used in non-gelatin photographic emulsions (U. S. 2,396,830).

Phloroglucinol, Technical

Props: Cream colored crystals. M. P. 212° C.; Ash: 0.2% maximum; ferric ion, none.

Uses: Developer in diazotype process; resin intermediate; coupling component in dyestuff manufacture.

Methylphloroglucinol, Tech.

Props: Cream to light tan crystals; M. R. 210-214° C.; Ash: 1.0% maximum; soluble in water, alcohol or ether; insoluble in benzene.

Uses: A very reactive coupling agent; potential dye and plastic intermediate.

Write for Price List No. 9-C for data on over 80 other Edwal Chemicals

The **EDWAL LABORATORIES, INC.**

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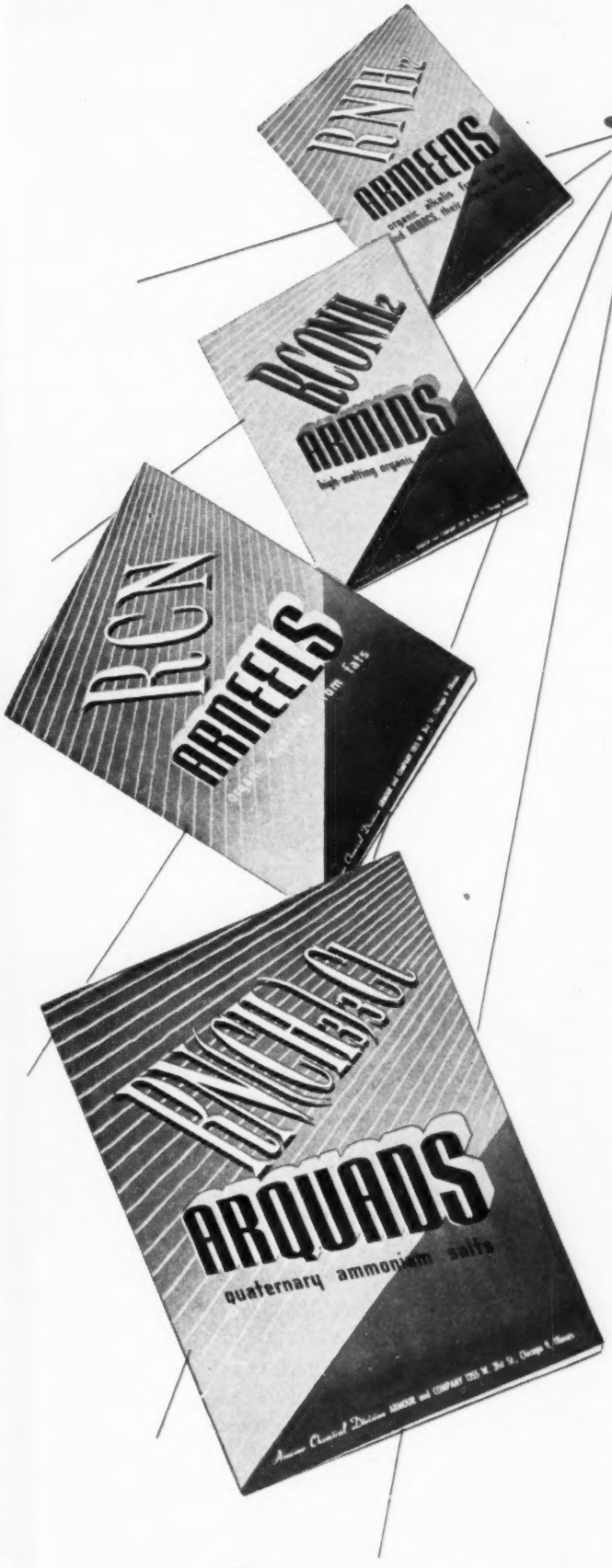

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Newest of the Armour "Chemicals from Fats" are the ARQUADS—a group of alkyl trimethyl ammonium chloride compounds now available in quantity for industrial use.

Current commercial applications of the ARQUADS are numerous and diversified. Their full utility is yet to be determined.

Among the present uses are: as industrial germicides, fungicides, and disinfectants; alkaline cleaning compounds; water-treating chemicals; ore flotation reagents; anti-static polishes for plastics; cationic emulsifiers and detergents; textile softeners.

In addition to these ARQUADS, special types of quaternaries ranging from water-soluble to oil-soluble can be produced to meet your specific requirements.

A new booklet containing chemical and physical data on the ARQUADS and their uses is available upon request. The coupon below may also be used for requesting similar booklets on the ARMEENS (aliphatic amines), the ARMIDS (aliphatic amides), and the ARNEELS (aliphatic nitriles) if these booklets are not already in your files.

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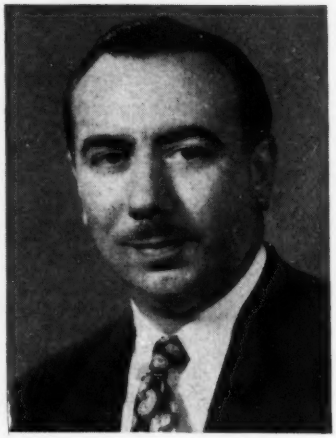
politan Life Insurance Co. Terms of the loan agreement provide, among other things, for interest at 2.95% and annual payments to the insurance company, beginning in 1956, of $1,000,000 with final maturity on June 1st, 1967.

AIR REDUCTION SALES CO. has opened a new acetylene plant at Dayton, Ohio. The plant superintendent will be R. K. Haygood, who has been with Air Reduction for over ten years.

BROWN & FORTH, LTD., London, manufacturers of various specialties, has established a branch office at 55 West 42nd Street, New York 18. The office is headed by F. F. Kraus.

Mast Joins Commercial Solvents



George W. Mast, named associate medical director of Commercial Solvents' pharmaceutical division. He will be concerned with clinical testing of new pharmaceuticals.

KINETIC CHEMICALS, INC., is installing equipment at East Chicago, Indiana, for the manufacture of "Freon" fluorine refrigerants which will increase the capacity by 75%. This plant is scheduled for operation in the spring of 1948.

CANADA

Rayon Makers Schedule Expansions

Total output of acetate and viscose rayon yarn by Canadian manufacturers reached 18,134,000 pounds last year representing an increase of 1,693,000 pounds over 1945. In addition to this domestic production Canadian imports of rayon filament yarn amounted to 5,173,000 pounds. Of this quantity, 4,230,000 pounds originated in Great Britain and 855,000 pounds came in from the U. S. Tire yarn consumption rose to 5,481,000 pounds.

At present both Canada's producers of rayon are expanding facilities. Courtaulds (Can.) Ltd. has a $7.5 million project under way and Canadian Celanese —which invested $2.5 million in new units last year—has allocated an addition-

"BEMUL"—BEACON BRAND of Glyceryl Monostearate

CHARACTERISTICS: A Pure white, edible material—in bead form . . . is completely dispersible in hot water . . . also completely soluble in alcohols and hydrocarbons (hot) . . . has a pH (3% aqueous dispersion at 25° C.) of 9.3 to 9.7 . . . melts at 58 to 59° C. (Capillary Tube) . . . is non-toxic and practically odorless.

SUGGESTED USES: As an emulsifier in the manufacture of cosmetics, pharmaceuticals and food stuffs (including paste emulsions of edible oils, shortenings, etc.) . . . as a protective coating for Edible Hygroscopic Powders and similar crystals and tablets (and even fresh fruit and vegetables) . . . as a pour point depressant for lubricating oils . . . as a lubricant for paper and cardboard in dry die-forming . . . as an emulsifying agent in the polymerization of synthetic rubber . . . as a protective anti-oxidant coating for metals . . . as a preliminary binder for clays, abrasives, etc. . . . as a general emulsifying or thickening agent . . . as a suspending agent for organic or inorganic materials in aqueous solutions.

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Stabilizer SN

for
HEAT-STABILITY
of Vinyl Resins

A new vinyl resin additive offering

- Effective heat stabilization
- Easy handling — fluid consistency
- Transparency with no clouding
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a. in vinyl plastics for high temperature mixing, extrusion, calendering, etc.

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SODIUM HYDROSULPHITE

"Virginia" Sodium Hydrosulphite is a concentrated, white, stable, free-flowing, uniformly crystalline powder, readily soluble in water. Its powerful action will reduce solutions of the salts of selenium, tellurium, arsenic, antimony, bismuth, silver, gold, copper, chromium, and mercury. It is widely used in the bleaching of soaps, sugars, oils, minerals, straw, and various fibres. Shipped in 250 lb. steel drums.

Perhaps "Virginia" $Na_2S_2O_4$ can perform some important function in improving your processes. Let us help you in adapting it . . . there's no obligation. VIRGINIA SMELTING COMPANY, West Norfolk, Virginia.

Established 1898

VIRGINIA *Chemicals*

SULFUR DIOXIDE
SODIUM HYDRO-SULPHITE • ZINC HYDROSULPHITE
ZINC SULFATE

WEST NORFOLK • NEW YORK • BOSTON • DETROIT

al $3 million for extensions to its main plant at Drummondville, Quebec. The latter company is also building a $3—$4 million plant at Sorel, Quebec, to manufacture yarn from staple supplied by its Drummondville project.

Southern Alkali Promotes Haley

E. Wayne Haley, advanced to the post of director of sales by Southern Alkali Corp. He succeeds Eli Winkler who will continue with the firm as sales consultant.

New Projects to Make DDT and BHC

Two major Canadian chemical companies, Canadian Industries Ltd. (I. C. I.-Dupont) and Nichols Chemical Co., subsidiary of General Chemical Co., New York, extended their interests in insecticide production this month.

The former concern completed plans for the manufacture of DDT at a new unit now under construction at Windsor, Ont., whereas Nichols Chemical brought in a benzene hexachloride facility.

Hitherto the bulk of Canada's DDT has been supplied by Naugatuck Chemicals Ltd. (subsidiary of U. S. Rubber Co.) and the Dominion's main benzene hexachloride needs have been looked after by imports from England and the U. S. A.

PERSONNEL

Company Officers

CHARLES H. DUGDALE has been made comptroller of the Woburn Chemical Corp., and ELEANOR DELANEY has been promoted to assistant comptroller. Mr. Dugdale was formerly head of the cost department.

ELMER P. WHEELER has been appointed director of a newly formed section of Industrial Hygiene in the Medical Department of Monsanto Chemical Co. He will be in charge of industrial hygiene in all Monsanto plants in this country. Headquarters of the section will be at the company's general offices in St. Louis.

Born of the Needs of Life

The science of chemistry can trace its origins to those practical arts that serve the needs of life.

Today the progress of chemistry rests on discoveries based upon purposeful research and directed ingenuity.

The vast and growing literature of chemical science presents a striking example of cooperative effort that is taken for granted by most of us. Through it, scientific investigators the world over are enabled to profit by new techniques and discoveries, so that they in turn may add to the sum of human knowledge, multiply the benefits of modern science, and supply in ever growing measure those materials which serve the needs of comfortable, gracious living.

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CHARLES F. HOSFORD, JR., president of Pennsylvania Coal Products Co., until its recent consolidation with the Chemical Division of Koppers Co., Inc., has been appointed a vice president in the Koppers Chemical Division.

PERCY C. MAGNUS, of Magnus, Mabee and Reynard, has been named chairman of the Drug and Chemical Industry Committee for the Police Athletic League, Inc.

Taylor Joins Wyandotte

A. Lloyd Taylor, formerly a vice-president of L. Shaw & Sons, has joined Wyandotte Chemicals Corp. as research supervisor. He will be concerned mainly with industrial detergent developments.

ARTHUR B. AUSTIN has been named assistant manager of the Explosive Dept., Hercules Powder, Co. He joined Hercules in 1933, shortly after graduating from the Colorado School of Mines.

LOUIS KOENIG has been appointed chairman of Chemistry and Chemical Engineering Department, Armour Research Foundation of Illinois Institute of Technology, Chicago. He previously was chief of the Research Branch of the United States Atomic Energy Commission, New York.

ELGIN S. NICKERSON has been appointed general manager of the Fabrics and Finishes Department of E. I. du Pont de Nemours and Co. He succeeds J. WARREN KINSMAN, who recently became a vice-president and member of the company's Executive Committee.

C. S. MOTT and CHARLES WETHERALD, both of Flint, Michigan have recently been elected to the board of directors of the Michigan Chemical Co.

Research

EUGENE LIEBER has joined the research staff, Armour Laboratories, Armour and Co. He comes from Nox-Rust Chemical Corp., where he served as chief chemist and technical director.

RALPH J. HOLTSCHLAG and ROBERT E. HOWARD have been made group leaders in the St. Louis Research Department of the Organic Chemicals Division, Monsanto Chemical Co.

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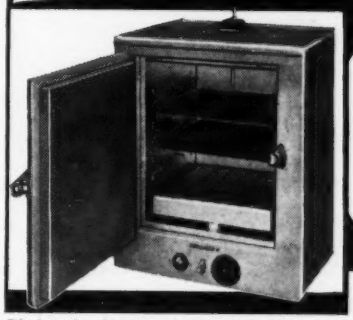

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Production

DIMITRY S. TROUBS has been appointed coordinator of manufacturing operations of Industrial Chemical Sales, Division of West Virginia Pulp and Paper. Co. He will direct chemical manufacturing operations in the company's six plants.

Pennsalt Promotes Lowdermilk

Ford R. Lowdermilk, chosen to be supervisor of the Development Division, Pennsylvania Salt Manufacturing Co. He replaces Frank R. Murphy who is now assistant production manager.

HARRY E. HARTZELL has been named operating assistant for the Cellulose Products Department, Hercules Powder Co. He has been cellulose acetate superintendent at Hercules' Parlin, N. J. plant.

Sales

FRED E. STRAUCH, Chicago branch manager of Innis, Speiden & Company, has become a member of the firm's Quarter Century Club. He started with Innis, Speiden in 1922 as a salesman.

MORRIS F. JACOBS, has been appointed Wisconsin representative for Illinois Testing Laboratories, Inc., 420 N. LaSalle Street, Chicago.

H. B. RASMUSSEN, formerly manager of the Chicago office, has become sales manager, Laboratory Chemical Division, for the J. T. Baker Chemical Co., Phillipsburg, New Jersey.

ALMON G. HOVEY has been appointed in charge of technical sales service, of Chemical Div., General Mills, Inc., Minneapolis. He has been with General Mills three years, serving on the research staff where he has been in charge of the new chemicals development section.

STEPHEN OTIS has joined the sales department of Julius Hyman Co. He will be assigned to the midwest territory where he will assist CHARLES C. COMPTON in entomological and sales activities.

ROBERT M. SIMPSON has been made acting district manager for the Chicago territory of Columbia Chemical Division, Pittsburgh Plate Glass Co.

WILLIAM A. KREBS has been named engineering and sales representative for the Liquid Conditioning Corp. for the district including Philadelphia, southern New Jersey and Delaware.

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CHEMICAL SPECIALTIES

A department devoted to news of the chemical specialties field. Descriptions of new specialty products will be found in the New Products & Processes department.

USDA Endorses Aerosols

Following extensive tests, the Department of Agriculture reports that use of liquified-gas aerosols provides a rapid and efficient method of controlling greenhouse insect pests.

DDT aerosols were found effective against a long list of such insects. The new insecticide hexaethyl tetraphosphate, applied as an aerosol, also proved effective against a number of pests.

Use of aerosols, says the Department, enables growers to treat crops in considerably less time and with less labor, than by spraying and dusting, also reduces danger of spreading disease incident to application of water sprays.

Savogran Develops New Brush Cleaner

"Just Two Easy Steps" is the advertising slogan which Savogran Co., Boston, Mass., is using to promote sale of its recently introduced paint brush cleaner. Recommended procedure: soak brushes in Savogran Liquid Cleaner overnight and then rinse under faucet.

It is being marketed as a milky white fluid, packaged in pint, quart and gallon bottles. It is claimed to be harmless to hands and brushes, non-flammable, stainless, and will remove any type of paint or enamel from brush bristles.

The company now has national distribution and is selling the cleaner mainly through paint, hardware, and department stores. Prices of 60¢ and a $1.00 have been established for pints and quarts, respectively.

Enthone Markets Water Displacing Agent

A novel product, designed to function as a water displacing liquid, has been placed on the market recently by Enthone, Inc., New Haven, Conn. It is recommended by the manufacturer for drying plated metals to prevent staining of chromium, silver, or silver plate.

The specialty, tradenamed Hydrex, is a thin, mobile liquid which has a high penetrating power, enabling it to displace water from blind holes and crevices. After the water is displaced the work is removed from the liquid and the solvent evaporates to leave a rust-inhibiting surface. Thus spots which normally remain on the metal surface, caused by deposits of solids dissolved in the water, are avoided. The water separates to the bottom of the bath and can be drawn off periodically.

Packed in gallon, 5 gallon, and 55 gallon containers, drum prices of $1.10 per gallon have been established.

Malmstrom Appoints Sunde

Conrad J. Sunde, appointed director of research, M. I. Malmstrom & Co. He served during the War as a WPB consultant, specializing in fats and oils.

U. S. Rubber Pushes Chlordane Products

The United States Rubber Co. recently added a new item to its line of insecticides with the introduction of Synklor. Containing chlordane as its main toxic ingredient, Synklor is being recommended as an agent for the control of roaches, ants, moths and carpet beetles.

Experiments have also indicated that it holds promise for combatting grasshopper infestations, houseflies, cotton boll weevils, Japanese beetles and a list of some 35 other pests.

The preparation is being marketed both as a liquid and as a dust. One liquid, tradenamed Synklor 20-C, is designed for household use. Agricultural grades include: Synklor 50-W, a wettable powder; Synklor 5-D, a dust, and Synklor 48-E, a liquid spray concentrate.

Pittsburgh Introduces Alkali Resistant Paint

An alkali resistant enamel for use on industrial machinery where cutting compounds and oils saponify regular paints, has been developed in the Paint Division laboratories of the Pittsburgh Plate Glass Company.

Developed for applications where alkaline conditions cause regular machinery finishes to lose color, become brittle and generally deteriorate, the new enamel employs a properly plasticized rubber base vehicle, which gives it satisfactory adhesion and flexibility. A green pigment that is not affected by alkali is employed.

This enamel is recommended for abnormal applications in most conditions of alkali up to ten per cent. "Soakers" and washing machines in bottling plants, valve and crankshaft grinders and lathes are typical usages for the new coating.

Sterling Streamlines Sales Set Up

The sales staffs of two pharmaceutical manufacturing units of Sterling Drug Inc. were merged into a single organization as of September 1. The two affected units are Winthrop Chemical Company, Inc., a subsidiary with headquarters in New York and manufacturing facilities in Rensselaer, N. Y., and Frederick Stearns & Company, a division with offices and plant in Detroit, Mich.

The entire field staffs of both companies will be consolidated into a single staff selling the products of both units. The new selling organization will emerge with 40 per cent more sales territories than Winthrop, the larger of the two units, now has.

Develop Daylight Color Paints

A series of interior "daylight" paint colors designed to lessen eye fatigue has been developed by Libbey-Owens-Ford Glass Company and has been made available to paint manufacturers.

The colors, originated by H. Creston Doner, director of the design department of the company, comprise four off-shades of white formulated to reduce glare from direct and reflected light. At Libbey-Owens-Ford, the colors are currently being applied to plants in four states in a $500,000 repainting operation.

Four standard shades for factory use have been developed: one for upper walls and ceilings to reduce glare and eliminate after-images when eyes are turned away from a window; one for machinery above the eye level; one for wainscoting and all wall areas at eye level, and one for machinery and traffic lanes below eye level.

Stress Low Toxicity of DDT Analog

A new insecticide called methoxychlor has proved to be 1/10 as toxic to warm-blooded animals as DDT, W. H. Tisdale, director of the pest control research section of the Grasselli Chemicals Department of the Du Pont Company, stated recently.

Methoxychlor, technically called bis (methoxyphenyl) trichloroethane, is an analog or close relative of DDT. It is

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	Max.	Min.	Typical Analysis
Specific Gravity 15.5C	0.938	0.933	0.936
Refractive Index 20C	....	1.480	1.482
Unpolymerized Residue	2.5%	....	0.8%
ASTM Distillation			
5%	....	195C	206C
95%	225C	....	220C
Moisture	1.0%	....	0.5%

PROPERTIES

Color: "Straw Yellow"
Tertiary Alcohols: Approximately 54 to 60%
Terpene Hydrocarbons: Approximately 10%
Phenol Coefficient: Approximately 5 on a concentrate containing 80% Pine Oil (F.D.A. Method)

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now being manufactured in limited quantities and indications are that it will prove to be particularly useful in the horticultural field.

Eagle Chemical Expands

The Eagle Chemical Co., Dallas, Texas, has purchased the building at 3416-18 Main Street for $25,000. The firm now has four times more floor space than in its former location.

Eagle manufacturers organic chemicals, disinfectants, sanitary sprays, and has a distributing area extending through the Southwest.

Allied Markets Novel Rust Remover

Sale of a liquid rust remover, tradenamed CorOdex, is now being promoted by Allied Products Co., Chicago. Claims for the rust remover are that it will remove heavy rust coatings and is so penetrating that it will also reach pin point spots, pits, and crevices. It can be applied either with a paint brush or cotton swab.

Other claims: it requires no rubbing, is non-explosive, non-inflammable, and will not corrode metal or affect the hands of the user. Small articles can be treated by dipping. Long immersion leaves the surface with a blue-black oxide finish, which reduces the resistance to subsequent rusting.

It is packaged in 55 gallon drums for industrial use, and is being retailed in 12 oz., quart bottles, and gallon containers.

Small Package Hand Protectant

Cadet Laboratories, Inc., Worcester, Mass., which began the manufacture of industrial hand protective creams in 1941, has recently extended its activities and is now small-packaging its product for retail sale. Tradenamed Handsaver and carrying the slogan "Handsaver Saves Hands" it is being sold mainly through hardware, automotive, and beauty shops.

Rubbed into the hands it is claimed to shield the skin from any non-aqueous irritants. Addition of water forms a lather and facilitates its removal.

At present it is being packaged in 4, 6, 16 oz. and gallon jars.

Adhesive Project for New Orleans

The Industrial Adhesive Co., Dallas, has begun operations in its branch factory recently established at 748 Orange St., New Orleans, according to Thomas W. Griffiths, III, president. By the end of the year the New Orleans branch will serve an area as far east as Florida and as far north as Memphis, Tenn. David R. Mizell, formerly with the Dallas branch, is manager.

The Dallas branch, at 713 West Davis Street, was established in 1940, and manufactures glues, pastes and gums from starches and dextrose.

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CHEMICAL MARKETS

Kaolin Prospects Encouraging

Future prospects for the domestic kaolin industry appear favorable but are governed by the general level of national prosperity, says the Tariff Commission in a special study of this industry.

Even if national income drops from present high levels, the Commission reports, consumption of kaolin in paper manufacture — its principal use — would probably be appreciably greater than pre-war; the trend toward production of papers containing kaolin will probably continue to gain.

Use of kaolin for admixture with rubber, which declined during war years because of the natural rubber shortage, and the superiority of carbon black in synthetic rubber for war use, has again approached pre-war level, under impetus of increased use of kaolin in civilian synthetic rubber items.

Pre-war, the United Kingdom and Czechoslovakia supplied the bulk of world exports of kaolin. The United States industry is largely in the southeastern states, with Georgia credited by the Commission with 70 to 75 per cent of total domestic output. Other important producers are: South Carolina, North Carolina and Florida.

Many Paintmakers' Raw Material to Ease

Although paintmakers have experienced a sharp decline in the demand for their products, the lull in business is regarded as but temporary by most companies. There is little doubt that higher prices which have obtained as a result of higher raw material costs, and the slow progress of housing projects, have diminished sales. Not to be overlooked, too, is the rather nonchalant attitude of landlords. Few are inclined to paint their buildings under present rental conditions—particularly in view of the wages painters are demanding.

Significantly, paint manufacturers can now look forward to a somewhat easier situation in raw material supplies—at least as far as several important commodities are concerned.

Present indications are that the supply-demand picture in lead will be much more favorable in the latter part of the year and that lead-derived pigments will ease accordingly. Too, based on present crop expectations, there should be a U. S. yield of 600-700,000,000 pounds of linseed. Moreover, if the Government maintains its support of flax prices, linseed quotations will continue high and demand will be pared.

Supplies of castor, tung and soybean oil should improve. The 1946 crop of tung, for instance, will probably total 15,000,000 pounds and a larger one is forecast for the 1947 crop year. Soybean prospects are of the order of 225,000,000 bushels.

No particular difficulties are foreseen in the supply picture for inorganic pigments, but a number of the inorganics will continue to be tight. Alkyd resins, dependent upon phthalic anhydride, are destined to remain on the short side, as well as phenol derivatives. Industrial alcohol prospects are encouraging but the odds are that mineral spirits will tighten during the winter.

Thus, although a far from free market will obtain, it does appear that the worst period of shortages has passed. On the horizon are definite signs of keener competition—not only pricewise but competition between many wartime "substitutes" and the old-line raw materials.

Significant Shifts in Salt Markets

According to the reports of producers to the Bureau of Mines, the United States produced 15,132,145 short tons of salt valued at $44,816,498 in 1946—a 2-per cent decline in quantity from 1945.

Three types of salt contributed to the total as follows: almost 56 per cent was brine (salt content); 23 per cent was rock salt; and 21 per cent was evaporated salt.

The salt was produced in 13 States and Puerto Rico, at 73 plants owned by 50 companies.

The most notable changes in the consumption of salt were in the decreases in brine used for soda ash and chlorine, and in dry salt used for meat packing and fish curing. There were increases for livestock, textile processing, water treatment, table and household purposes, and for "other food processing," and hides and leather.

"Other uses" includes synthetic rubber manufacture, the output of which declined in 1946. Exclusive of the salt used for chlorine in rubber manufacture, about 100,000 tons of rock and evaporated salt were used for making synthetic rubber and rubber products. This is about half of what was used in 1945.

Much of the salt used for livestock originated in Kansas, Michigan, Ohio, and New York. The areas of maximum consumption naturally were in the greatest cattle-raising sections. Table salt is supplied chiefly by Michigan, New York, and Louisiana.

Tire Cutback Frees Carbon Black

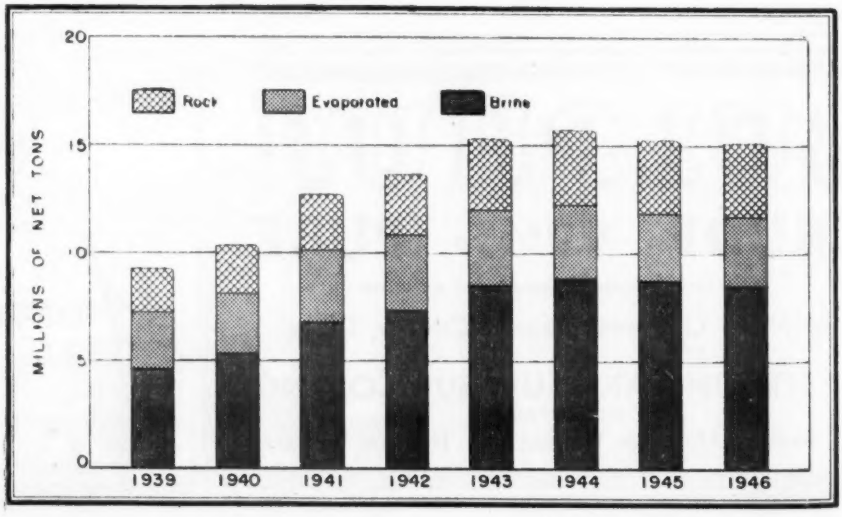
Recent, and imminent developments, indicate a sharp cutback in the demand for carbon blacks, which will result in some significant changes in the marketing pattern of the industry.

It began with the curtailment of tire output by major rubber fabricators. This cutback, alone, released substantial tonnages of black for other industrial users —such as makers of paints, typewriter ribbons, inks, and so forth. Too, it improved the prospects of exports. For almost six years foreign consumers have been neglected as a result of the pressing needs of domestic users.

Nor is the situation regarded as temporary. It is fully expected that, with supply hovering near demand, tire output will continue to decline over the long term. Too, with natural rubber regulations easing, and the probability that more natural rubber will be used in rubber compoundings, less carbon black will be required per unit tire.

So far carbon black companies have not curbed output of channel types, but

Changing Character of Common Salt



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some curtailment of furnace types has been implemented. Incidentally, most overseas buyers prefer the channel variety and indications are that the export market will absorb substantial quantities during the next few months at least.

Gypsum Producers Hit New Peak

The gypsum industry in 1946 produced and imported a total of 7,086,538 short tons of gypsum setting a new supply record, 10 percent above the previous record set in 1926, and 64 percent above 1945. Mine output reached 5,629,398 tons, nearly equal to the production record of 5,678,302 tons that was established in 1925, and 1,457,140 tons were imported.

Calcined production, obtained from 50 plants distributed through 23 States, was 68 percent higher than in 1945. The number of active plants increased by 8 and the number of kilns by 19.

Bauxite Industry Stages Comeback

Domestic production of bauxite established a postwar high in the first quarter of 1947 and imports were almost double those of the preceding quarter, according to the Bureau of Mines. Output was 381,847 long tons (324,570 tons dried equivalent) in the first quarter, compared with 373,676 tons (317,625 tons dried equivalent) in the preceding quarter. Arkansas contributed 96 percent of the first-quarter production and Alabama and Georgia furnished the remainder.

Imports of bauxite in the first quarter were 432,848 long tons, a gain of 83 percent over the preceding quarter. Surinam continued to be the chief source of the imports, supplying 78 percent of the toal; but receipts from British Guiana in the first quarter were double those of the entire year of 1946.

Fertilizer Exports and Imports Up

Exports of fertilizers and fertilizer materials during May 1947 amounted to 159,000 short tons with a value of $3,966,000. The export tonnage reported for May was 7 per cent greater than the 149,000 short tons for April and was greater than for any month since August of 1945.

Exports during May were 66 per cent greater than the 95,000 tons shipped a year ago and 94 per cent greater than the 82,000 tons reported for May 1945.

Imports of fertilizers and fertilizer materials during May 1947, totaling 160,000 short tons with a value of $5,237,000, were 7 per cent greater than the 149,000 tons reported for last May but were 31 per cent below the 231,000 tons imported during May 1945. With the exception of April 1947, when imports amounted to 169,000 tons, May imports were greater than for any month since May of 1945.

Chemical Output Shows Unusual Variations

Output of industrial inorganic chemicals in June dropped slightly from the high production level maintained during May. A survey of 35 major inorganic chemicals disclosed that 24 were produced in lesser volume in June than in May. However, only seven were produced at a lower rate this June than in June, 1946.

The large volume acids, hydrochloric, nitric, and sulfuric, dropped to the lowest daily production rate observed for those chemicals this year. Nevertheless a considerably larger quantity of the three acids was produced this June than in the corresponding month of last year.

The output of phosphoric acid and the phosphatic compounds with the exception of dibasic sodium phosphate did not follow the downward trend of other groups of chemicals. Production of phosphoric acid and meta sodium phosphate was the highest for any month on record. Dibasic sodium phosphate production declined slightly from the high May level but more than doubled the output in June, 1946. Only monobasic calcium phosphate was produced at a lower rate this June than last.

Production of lead arsenate was the lowest for any June in recent years.

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The Model JK has two filling stations. When the machine is used as an Automatic Volume Packer the empty containers are elevated, causing the actual filling to take place under the amount of controlled pressure suitable for the type of material and the size of container into which it has to be packed. This same principle is used when the machine is equipped as a Packer-Weigher, except that the main portion of the contents is packed under pressure, the remainder finished by weighing for accuracy. When the machine is used as a Volume Filler or Gross Weigher, provision can be made to incorporate a vibrating type of settling device to settle the material after filling.

The machine can be equipped for intermittent conveyor motion to facilitate handling of oval or irregularly shaped containers. With this intermittent motion, the conveyor moves just enough to deliver one container at the transfer station, thus preventing climbing and piling up of the containers.

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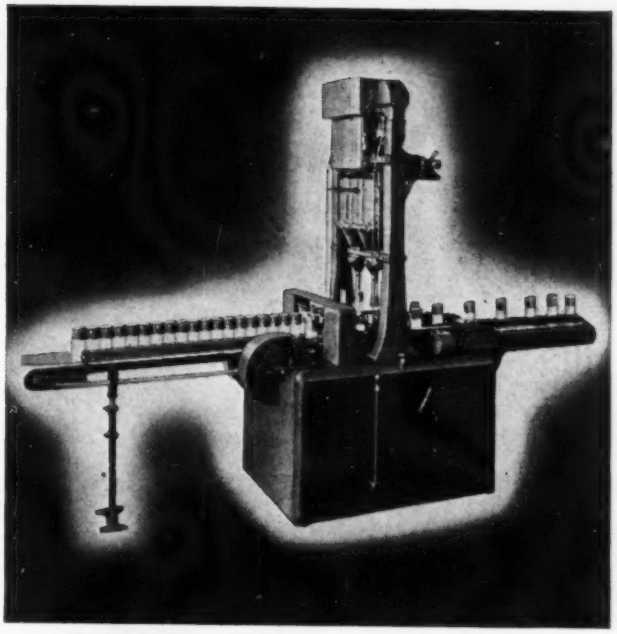

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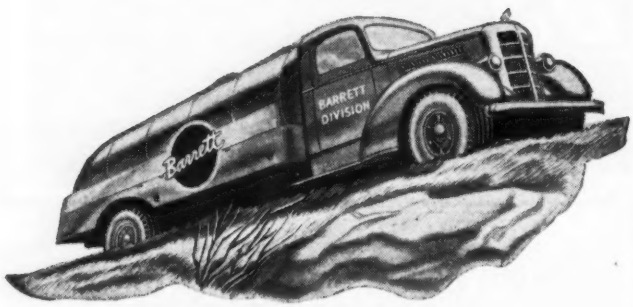

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CURRENT PRICES

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Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00
August, 1945, $0.864 August, 1946, $0.767
August, 1947, $0.61

	Current		1947		1946	
	Low	High	Low	High	Low	High
Acetaldehyde, 99%, drs.wks..lb.	.11	.12	.11	.15	.11	.14
Acetic Anhydride, drs.....lb.	.13	.14½	.11½	.14½	.11½	.13
Acetone, tks, delv.....lb.	.07	.09	.07	.10	.06	.07
ACIDS						
Acetic, 28% bbls.....100 lbs.	3.78	4.08	3.38	4.08	3.38	3.63
Glacial, bbls.....100 lbs.	10.65	10.90	9.15	10.90	9.15	9.40
drs, wks.....100 lbs.	13.20	13.75	6.93	13.75	6.93	7.25
Acetylsalicylic, Standard USP.....lb.	.45	.59	.45	.59	.40	.59
Benzoic, tech, bbls.....lb.	.43	.47	.43	.47	.43	.47
USP, bbls., 4,000 lbs. up..lb.	....	.54	....	.54	....	.54
Boric tech, bbls. c-l.....tons *a*	....	137.50	....	137.50	....	109.00
Chlorosulfonic, drs, wks.....lb.	.03	.04½	.03	.04½	.03	.04½
Citric, USP, crys, gran, bbls.....lb. *b*	.22	.23	.20	.23	.20	.21
Cresylic 50%, 210-215° HB, drs, wks, frt. equal.....gal.	....	1.26	1.01	1.26	.81	1.04
Formic, 85%-90% cbys.....lb.	.12	.14½	.10	.14½	.10	.13
Hydrofluoric, 30% rubber, drs.....lbs.	.08	.09	.08	.09	.08	.09
Lactic, 22%, lgt, bbls, wks..lb.	.44	.48	.039	.0415	.039	.0415
44%, light, bbls, wks.....lb.	.815	.855	.073	.855	.073	.0755
Maleic, Anhydride, drs.....lb.	.25	.26	.25	.26	.25	.26
Muriatic 18° cbys.....100 lbs.	1.50	2.90	1.50	2.90	1.50	2.45
20° cbys, c-l, wks.....100 lbs.	1.85	2.00	1.85	2.00	....	1.75
22° cbys, c-l, wks.....100 lbs.	2.35	2.50	2.35	2.50	....	6.00
Nitric, 36°, cbys, wks..100 lbs. *c*	5.00	6.30	5.00	6.30	5.00	5.25
38°, c-l, cbys, wks...100 lbs. *c*	2.35	5.50	....	5.50	....	5.50
40°, c-l, cbys, wks...100 lbs. *c*	6.00	6.50	....	6.50	....	6.00
42°, c-l, cbys, wks...100 lbs. *c*	6.50	7.00	....	7.00	....	6.50
Oxalic, bbls, wks.....lb.	.13	.14	.11¾	.14	.11¾	.14½
Phosphoric, 100 lb. cbys, USP.....lb.	.10½	.13	.10½	.13	.10½	.13
Salicylic tech, bbls.....lb.	.31	.38	.26	.42	.26	.42
Sulfuric, 60°, tks, wks.....ton	13.00	13.50	....	13.50	....	13.00
66°, tks, wks.....ton	16.50	17.50	....	17.50	....	16.50
Fuming 20% tks, wks....ton	19.50	20.50	....	20.50	....	19.50
Tartaric, USP, bbls.....lb.	.49½	.50	.49½	.55	.54½	.71
Alcohol, Amyl (from Pentane) tks, delv.....lb.	....	.151	....	.151	....	.131
Butyl, normal, syn, tks...lb.	....	.16½	....	.16½	....	.14½
Denatured, CD 14, c-l drs.....gal. *d*	....	1.04½	....	1.06	....	.90
Denatured, SD, No. 1, tks. *d*	....	.98	....	.98½	....	.82½
Ethyl, 190 proof tks.....gal.	....	18.08	....	18.08	....	17.94
Isobutyl, ref'd, drs.....lb.	....	.13	....	.13	....	.0860
Isopropyl ref'd, 91%, dms.....gal.	.44	.47½	.41	.50½	.38	.47
Alum, ammonia, lump, bbls, wks.....100 lbs.	....	4.25	....	4.25	....	4.25
Aluminum, 98.99%....100 lbs.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd, l.c.l. wks..lb.	....	.10¼	....	.10¼	.09	.12
Hydrate, light, bgs.....lb.	....	.17	....	.17	....	.14½
Sulfate, com'l, bgs, wks, c-l.....100 lbs.	1.15	1.30	1.15	1.30	1.15	1.25
Sulfate, iron-free, bgs, wks .....100 lbs.	1.95	2.25	1.75	2.50	1.75	2.00
Ammonia anyhd, cyl.....lb.	.16	....	.14½	.20	....	.14½
Ammonia, anhyd, fert, tank cars, wks, frt. equalized...ton	....	59.00	....	59.00	....	59.00
Ammonium Carbonate, USP, lumps, drs.....lb.	.08¼	.13½	.08¼	.13½	.08¼	.09½
Chloride, whi, bbls, wks, 100lbs.	4.75	5.00	4.45	5.15	4.45	5.15
Nitrate, tech, bgs, wks....lb.	.0435	.0450	.0435	.0450	.0435	.0850
Oxalate pure, grn, bbls....lb.	....	.23	....	.23	....	.23
Perchlorate, kgs.....lb.	no stocks		no stocks		no stocks	
Phosphate, dibasic tech, bgs.....lb.	.07	.07¾	.07	.07¾	.07	.07¾
Stearate, anhyd, drs.....lb.	....	.34	....	.34	....	.34
Sulfate, drs, bulk.....ton	30.00	35.00	30.00	35.00	28.20	30.00
Amyl Acetate (from pentane) tks, delv.....lb.	....	.21	...	.21	....	.181
Aniline, Oil, drs.....lb.	.13	.14	.12	.14	.11½	.13
Anthraquinone, sub, bbls....lb.	....	.70	...	.70	....	.70
Antimony Oxide, bgs.....lb.	.26	.27½	.21	.31	.15	.21¾
Arsenic, whi, bbls, powd....lb.	.06	.08	.05	.08	.04	.05¾

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices. *a* Powdered boric acid $5 a ton higher; *b* Powdered citric acid is ½c higher; *c* Yellow grades 25c per 100 lbs. less in each case; *d* Prices given are Eastern schedule.

	Current Low	Current High	1947 Low	1947 High	1946 Low	1946 High
Barium Carbonate precip, wks, bgs.....ton	67.50	82.00	60.00	82.00	60.00	75.00
Chloride, tech, cryst, bgs, zone 1.....ton	85.00	95.00	73.00	95.00	73.00	78.00
Barytes, floated, paper bgs..ton	....	41 95	....	41.95	....	41.95
Bauxite, bulk mines.....ton	8.50	10.00	7.00	10.00	7.00	10.00
Benzaldehyde, tech, cbys, drs.lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, tks, frt all'd.....gal.	....	.19	....	.19	....	.17
Benzyl Chloride, cbys.....lb.	.20½	.22	.20	.23	.20	.24
Beta-Naphthol, tech, bbls, wks.....lb.	.23	.29	.21	.29	.21	.24
Bismuth metal, ton lots.....lb.	....	2.00	....	2.00	1.25	1.80
Blanc Fixe, 66⅔% Pulp, bbls, wks.....ton *h*	55.00	60.00	40.00	60.00	40.00	46.50
Bleaching Powder, wks. 100 lbs.	2.75	3.75	2.50	3.75	2.50	3.60
Borax, tech, c-l, bgs.....ton *i*	53.50	56.00	45.00	56.00	....	45.00
Bordeaux Mixture, bgs.....lb.	.15	.23	.11	.23	.11	.11½
Bromine, cases.....lb.	.21	.23	.21	.23	.21	.23
Butyl, acetate, norm. drs....lb.	.30½	.31½	.26	.33½	.1860	.26½
Cadmium Metal.....lb.	1.75	1.80	....	1.80	.90	1.55
Calcium, Acetate, bgs..100 lbs.	3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs.....ton	50.00	90.00	50.00	90.00	50.00	90.00
Chloride, flake, bgs, c-l...ton	21.50	38.00	18.50	38.00	18.50	38.00
Solid, 73-75% drs, c-l....ton	21.00	37.50	18.00	37.50	18.00	37.50
Cy'n'd, min. 21% N, c.l...lb.	.02¼	.02¾	.02¼	.02¾	....	....
Gluconate, USP, bbls.....lb.	.58	.65	.57	.65	.57	.59
Phosphate tri, bbls, c-l...lb.	....	.0635	....	.0635	....	.0635
Camphor, USP, gran, powd, bbls.....lb.	.72	.78	.75	.82	.69	.82
Carbon Bisulfide, 55-gal. drs..lb.	.05	.05¾	.05	.05¾	.05	.05¾
Dioxide, cyl.....lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, Zone 1, 52½ gal. drs.....lb.	.06½	.07	.06	.07	.69	.80
Casein, Acid Precip, bgs, 10,000 lbs. or more.....lb.	.24½	.25	.26	.35	.24	.33
Chlorine, cyls, lcl, wks, contract.....lb.	.09	.10½	.08¾	.10½	....	.07¼
cyls, c-l, contract.....lb. *j*	....	.06¾	....	.06¾	....	.05¼
Liq. tk, wks, contract. 100 lbs.	....	2.00	....	2.30	....	2.30
Chloroform, tech, drs.....lb.	.20	.23	.20	.23	.20	.23
Coal tar, wks, crude..... bbl.	9.50	10.00	8.25	10.00	8.25	9.00
Cobalt, Acetate, bbl.....lb.	....	.83¾	....	.83¾	....	.83¾
Oxide, black kgs.....lb.	1.275	1.30	....	1.30	....	1.84
Copper, metal.....100 lbs.	....	21.50	21.50	24.00	12.00	14.75
Carbonate, 52-54%, bbls..lb.	.24	.26	.19½	.26½	.19½	.20½
Sulfate, bgs, wks cryst. .....100 lbs.	7.60	8.00	7.10	8.60	5.00	7.25
Copperas, bulk, c-l, wks....ton	....	14.00	....	14.00	....	14.00
Cresol, USP, drs.....lbs.	.14	.15¾	.13¾	.15¾	.10¾	.14¼
Dibutylamine, c-l, drs, wks..lb.	....	.76	....	.76	....	.66
Dibutylphthalate, drs.....lb.	.32	.34½	.29	.34½	.17	.29½
Diethylaniline, drs.....lb.	....	.48	....	.48	....	.48
Diethyleneglycol, drs, wks...lb.	.14	.15	.14	.15	.14	.15
Dimethylaniline, drs, cl., lcl..lb.	.21	.24¼	.20	.24¼	.21	.22
Dimethylphthalate, drs.....lb.	.23½	.24¾	.20	.24¾	.20	.20½
Dinitrobenzene bbls.....lb.	....	.16	....	.16	....	.18
Dinitrochlorobenzene, dms...lb.	.14	.15½	14	.15½	....	.14
Dinitrophenol, bbls.....lb.	....	.22	....	.22	....	.22
Dinitrotoluene, drs.....lb.	....	.18	....	.18	....	.18
Diphenyl, bbls, lcl, wks.....lb.	.16	.20	.16	.20	.16	.20
Diphenylamine bbls.....lb.	....	.25	....	.25	....	.25
Diphenylguanidine, drs.....lb.	.35	.37	.35	.37	.35	.37
Ethyl Acetate, syn. 85-90% tks, frt. all'd.....lb.	....	.09½	....	.09½	....	.09½
Chloride, USP, bbls.....lb.	.20	.22	.18	.22	.18	.20
Ethylene Dichloride, lcl. wks, E. Rockies, drs.....lb.	.09	....	.0891	.0950	.0842	.0941
Gylcol, dms. cl.....lb.	....	.12	....	.12	....	.10
Fluorspar, No. 1, grd. 95-98% bulk, cl-mines.....ton	....	37.00	....	37.00	....	37.00
Formaldehyde, bbls, cl & lcl..lb.	.0645	.0745	.0520	.0745	.0520	.0570
Furfural tech, tks.....lb.	....	.09½	....	.13	....	.13
Fusel Oil, ref'd, drs, dlvd....lb.	.26½	.27½	.18½	.27½	.18½	.19½
Glauber's Salt, Cryst, bgs, wks..... 100 lbs.	1.25	1.75	1.05	1.75	1.05	1.45
Glycerine dynamite, drs, c-l..lb.	....	.29½	.29½	.75¾	.17½	.55¼
Crude Saponification, 88% to refiners tks.....lbs.	.23	.24	.23	.60	....	.60

GUMS

Gum Arabic, amber sorts bgs.lb.	.14	.14½	.13¾	.15	.11¾	.14½
Benzoin, Sumatra, cs.....lb.	.55	.60	.60	1.00	.52	1.70
Copal, Congo.....lb.	no prices		....	no prices	....	.55¾
Copal, East India, chips....lb.	no prices		....	no prices	....	.55¾
Macassar dust.....lb.	no prices		....	no prices	....	.07½
Copal Manila.....lb.	no prices		.25	....	.13½	.25
Copal Pontianak.....lb.	no prices		....	no prices	....	.17½
Karaya, bbls, bxs, drs.....lb.	.20	.51	.20	.55	.18	.50

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

SARANAC D-10" for fast—SIFTPROOF—economical BAG CLOSURES . . . . . .

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A SINGLE pass through the Saranac D-10" gives a stout, siftproof closure as fast as the operator can feed—up to 75 per minute. The double-reverse fold is formed automatically and locked with one to six staples driven simultaneously. The D-10" also seals bottoms of empty bag-tubes.

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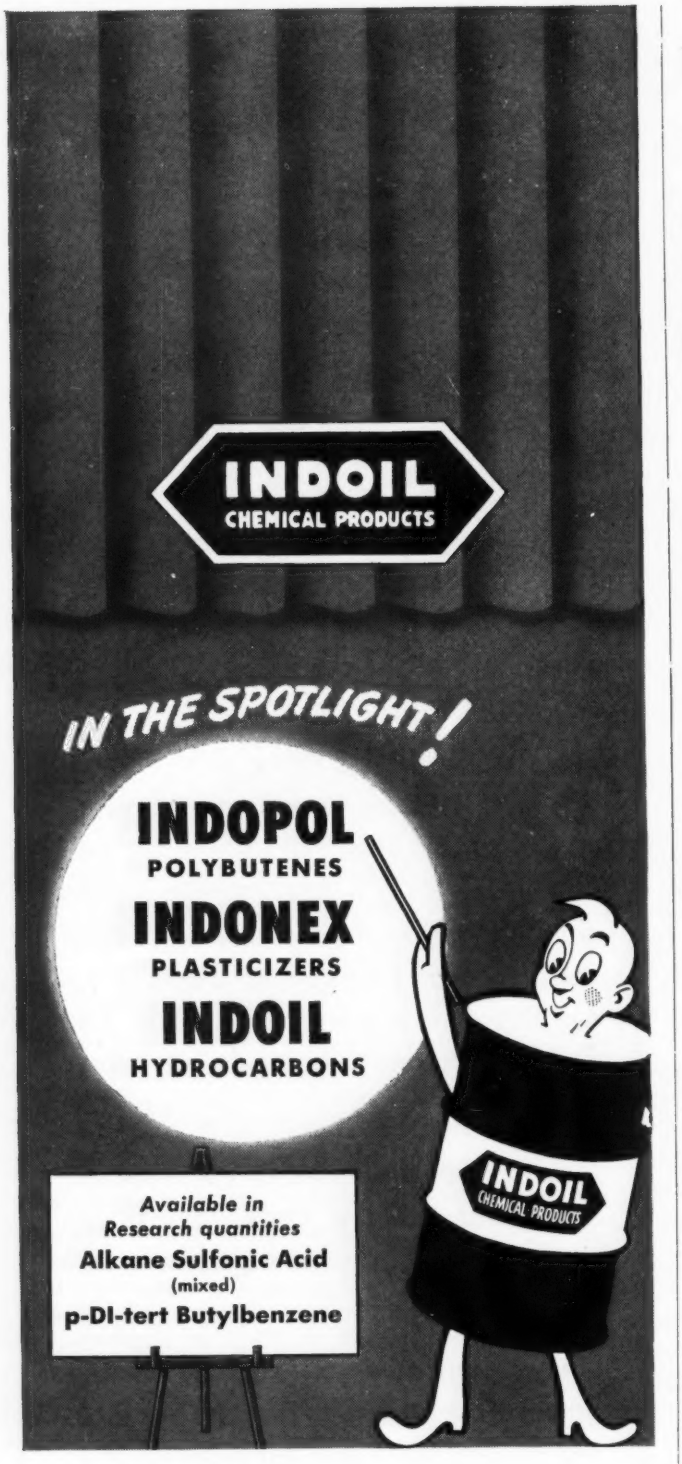

Address inquiries to

STANDARD OIL COMPANY

(INDIANA)

CHEMICAL PRODUCTS DEPARTMENT

910 South Michigan Avenue Chicago 80, Illinois

	Current Low	Current High	1947 Low	1947 High	1946 Low	1946 High
Kauri, N. Y.						
Superior Pale XXX....lb.	no prices		....	nom.	....	.65¾
No. 3....lb.	no prices		....	nom.	....	.22
Sandarac, cks....lb.	.85	.90	.85	.95	.90	.99½
Tragacanth, No. 1, cases....lb.	3.75	3.80	3.75	5.25	3.75	5.25
No. 3....lb.	2.00	2.10	2.10	3.45	2.10	3.45
Yacca, bgs....lb.	.07	....	....	nom.	.05	.07¼
Hydrogen Peroxide, cbys....lb.	.15½	.18½	.15½	.18½	.15½	.18½
Iodine, Resublimed, jars....lb.	2.35	2.65	....	2.65	1.75	2.10
Lead Acetate, cryst, bbls....lb.	....	.19¼	....	.19¼	....	.16¾
Arsenate basic, bg, lcl....lb.	.22¾	.23¾	....	.23¾	.12	.18
Nitrate, bbls....lb.	.17¾	.18	....	.18	....	.12½
Red, dry, 95% Pb_3O_4 bbls....lb.	.178	.18½	.14¼	.19¼	.09	.16
97% Pb_3O_4, bbls delv...lb.	.1785	.18¾	.15	.19½	.09½	.16¾
98% Pb_3O_4, bbls delv...lb.	.181	.19	.15¾	.19¾	.08¾	.17
White, bbls....lb.	.16	.16¼	.13	.17¾	.07¾	.14¼
Basic sulfate, bbls, lcl...lb.	.15¼	.15½	.12½	.15½	.07¾	.13¼
Lime, Chem., wks, bulk....ton	6.50	10.25	6.50	10.25	6.50	10.25
Hydrated, f.o.b. wks....ton	8.00	12.14	8.00	12.14	8.50	12.00
Litharge, coml, delv. bbls....lb.	.166	.17½	.13	.17½	.08	.15¼
Lithopone, ordi., bgs....lb.	.05½	.06	.03	.06	.04¼	.05¼
Magnesium Carb, tech, wks..lb.	.07¾	.10¾	.07¼	.10¾	.07¾	.10¾
Chloride flake, bbls, wks c-l....ton	....	37.00	....	37.00	....	32.00
Manganese Chloride, Anhyd. bbls....lb.	.14	.16	.14	.16	.14	.18
Dioxide, Caucasian bgs, lcl....ton	74.75	79.75	74.75	79.75	74.75	79.75
Methanol, pure, nat, drs..gal. *l*	.63	.73	.63	.73	.63	.73
Synth, drs cl....gal. *m*	.34½	.41½	.31	.41½	.24	.38
Methyl Acetate, tech tks....lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv..lb.	.09½	.10½	.09½	.10½	.09½	110½
Chloride, cyl....lb.	.33	.41	.32	.41	.32	.40
Ethyl Ketone, tks, frt all'd.lb.	....	.09	....	.09	....	.09
Naphtha, Solvent, tks....gal.	....	.28	....	.28	....	.27
Naphthalene, crude, 74°, wks, tks....lb.	.035	.0475	.035	.083	.0275	.035
Nickel Salt, bbls, NY....lb.	.14	.14½	.14	.14½	.13	.14½
Nitre Cake, blk....ton	20.00	24.00	....	24.00	....	16.00
Nitrobenzene, drs, wks....lb.	.08½	.10	.08	.09½	.08	.09
Orthoanisidine, bbls....lb.	....	.70	....	.70	....	.70
Orthochlorophenol, drs....lb.	....	.37	.25	.37	.25	.27
Orthodichlorobenzene, drs..lb.	.07½	.10½	.07	.10½	.07	.08
Orthonitrochlorobenzene, wks....lb.	.15	.18	.15	.18	.15	.18
Orthonitrotoluene, wks, drs.lb.	.08	.09	.08	.09	....	.09
Paraldehyde, 98%, wks lcl...lb.	....	.13	....	.13	....	.12
Chlorophenol, drs....lb.	.25	.29	.24	.29	.24	.27
Dichlorobenzene, wks....lb.	.12½	.14	.12½	.14	.11	.17
Formaldehyde, drs, wks...lb.	.21	.22	....	.22	.21	.22
Nitroaniline, wks, kgs....lb.	.41	.43	.41	.43	.41	.45
Nitrochlorobenzene, wks..lb.	....	.15	....	.18	....	.18
Toluenesulfonamide, bbls..lb.	....	.70	....	.70	....	.70
Toluidine, bbls, wks....lb.	.44	.53	....	.53	....	.48
Penicillin, ampules per 100,000 units, bulk	....	.19	....	.38	.38	.95
Pentaerythritol, tech....lb.	.32	.36	.27	.36	.27	.31

PETROLEUM SOLVENTS AND DILUENTS

Lacquer diluents, tks, East Coast....gal.	.13	.13½	....	.13	.11½	.12½
Naphtha, East tks, wks....gal.	.11	.11½	....	.11	.11	.12
Rubber solvents, East, tks, wks....gal.	.12½	.13	....	.12	.11	.12
Stoddard Solvents, East, tks, wks....gal.	.11½	.12	....	.12	.10	.12

Phenol, U.S.P., drs....lb.	.11¼	.13¼	.11¼	.13¼	.10½	.13¼
Phthalic Anhydride, cl and lcl, wks....lb.	.14½	.18½	.14½	.15½	.13	.15½
Potash, Caustics, 88-92%, wks, sol....lb.	.06¾	.07½	.06¾	.07½	.06¼	.06¾
Flake, 88-92%....lb.	.07½	.08¼	.07	.08¼	.07	.07½
liquid, 45% basis, tks...lb.	....	.03½	....	.03½	....	.02½
drs, wks....lb.	.03375	.0375	.03¼	.04	.03	.03½
Carbonate, hydrated 83-85%, bbls....lb.	....	.05¾	....	.05¾	....	.05½
Chlorate crys, kgs, wks...lb.	.08½	.09¾	.08½	.13	.11	.13
Chloride, crys, tech, bgs, kgs....lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks....lb.	....	.55	....	.55	....	.55
Iodide, drs....lb.	1.95	1.98	1.44	1.98	1.44	1.48
Muriate dom, 60-62-63% K_2O bulk unit-ton....	....	.53½	....	.53½	.53½	.56½
Permanganate, USP, wks drs....lb.	.22½	.23	.20½	.23	.20½	.21
Sulfate, 90%, basis, bgs..ton	36.25	39.25	36.25	39.25	36.25	39.25
Propane, group 3, tks....gal.	....	.03½	....	.03¾	....	.03¾
Pyridine, ref., drs....lb.	.60	.65	.55	.65	.45	.55½
R Salt, 250 lb. bbls, wks....lb.	.61	.72	....	.72	....	.65
Resorcinol, tech, drs, wks...lb.	....	.68	.64	.74	.64	.74
Rochelle Salt, cryst....lb.	.34½	.35	.34½	.35	.34½	.47
Salt Cake, dom, blk wks....ton	20.00	26.00	....	26.00	....	15.00
Saltpeter, grn. bbls....100 lbs.	8.00	9.50	8.20	9.50	8.20	9.00

l Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided into 4 zones, prices varying by zone. Spot price is ½c higher.

	Current Low	Current High	1947 Low	1947 High	1946 Low	1946 High
Shellac, blchd. bone dry, bbls. lb.	....	.59	.65	.74½	.42½	.74½
Silver Nitrate, bots, 2,500-oz. lots oz.	....	.42¼	.42¼	.59	.47	.59
Soda Ash, 58% dense, bgs, c-l, wks. 100 lbs.	....	1.28	....	1.28	....	1.28
58% light, bgs cl. 100 lbs.	....	....	....	1.30	1.05	1.20
Caustic, 76% flake drs, cl. 100 lbs.	....	3.00	2.90	3.00	....	3.00
76% solid, drs, cl. 100 lbs.	....	2.60	2.50	2.75	....	2.75
Liquid, 47-49%, sellers, tks. 100 lbs.	....	2.10	....	2.10	....	2.10
Sodium Acetate, anhyd. drs. lb.	.06½	.10	.06½	.10	.08½	.10
Benzoate, USP drs. lb.	.46	.52	.46	.52	.46	.52
Bicarb, USP, gran., bgs., cl., works. 100 lbs.	..	2.25	2.25	2.59	1.55	2.59
Bichromate, bgs, wks l.c.l. lb.	.08¾	.08⅞	.07⅞	.08⅞	.07⅞	.08⅛
Bisulfate powd, bbls, wks. 100 lbs.	3.00	3.60	3.00	3.60	3.00	3.60
35° bbls., wks. 100 lbs.	1.40	1.65	1.40	1.65	1.40	1.65
Chlorate, kgs, wks c.l. lb.	....	.06¼	....	.06½	....	.06¼
Cyanide, 96-98%, drs. lb.	.14½	.15	.14½	.15	.14½	.15
Fluoride, 95%, bbls, drs. lb.	.09¾	.10	.07¾	.10	.07¾	.08¼
Hyposulfite, cryst, bgs, cl, wks. 100 lbs.	....	2.75	....	2.75	....	2.25
Metasilicate, gran, bbl, wks c-l. 100 lbs.	....	3.40	....	3.40	....	3.40
Nitrate, imp, bgs. ton	....	41.50	....	41.50	33.00	38.50
Nitrite, 96-98% bbl. cl. lb.	....	.06¾	....	.06¾	....	.06¾
Phosphate, dianhyd. bgs, wks. 100 lbs.	6.25	7.00	6.00	7.00	6.00	6.75
Tri-bgs, cryst, wks. 100 lbs.	3.50	3.90	2.70	3.90	2.70	3.10
Prussiate, yel. bbls, wks. lb.	....	.12¼	....	.12¼	.	.11
Silicate, 52°, drs, wks. 100 lbs.	1.55	2.00	1.40	2.00	1.40	1.80
40°, drs, wks, c-l. 100 lbs.	.95	1.15	....	1.15	....	.80
Silicofluoride, bbls, NY. lb.	.07½	.08½	.06½	.08½	.06½	.10
Sulfate tech, Anhyd, bgs. 100 lbs.	2.10	2.60	1.70	2.60	1.70	2.20
Sulfide, cryst c-l, bbls, wks. 100 lbs.	....	3.25	....	3.00	....	2.40
Solid, bbls, wks. lb.	3.50	5.50	3.05	5.50	3.15	3.90
Starch, Corn, Pearl, bgs. 100 lbs.	6.37	6.97	4.99	6.52	4.321	6.271
Potato, bgs, cl. lb.	....	.08¾	.0735	.09	.0735	.0760
Rice, bgs. lb.	no stocks		no stocks		no stocks	
Sweet Potato, bgs. lb.	no stocks		no stocks		no stocks	
Sulfur, crude, mines. ton	....	18.00	....	18.00	....	16.00
Flour, USP, precp, bbls, kgs. lb.	.18	.30	.18	.36	.18	.26
Roll, bbls. 100 lbs.	2.65	3.40	2.65	3.40	2.40	3.40
Sulfur Dioxide, liquid, cyl. lb.	....	.085	.07	.095	.07	.08
tks, wks. lb.	....	.044	....	.044	....	.04
Talc, crude, c-l, NY. ton	....	15.00	....	15.50	....	15.50
Ref'd, c-l, NY. ton	14.50	24.50	14.50	24.50	13.00	21.00
Tin, crystals, bbls, wks. lb.	.55	.60	....	.60	no stocks	
Metal. lb.	....	.80	....	.80	....	.70
Toluol, drs, wks. gal.	..	.28	....	.28	.27	.32
tks, frt all'd. gal.	..	.23	....	.23	.22	.27
Tributyl Phosphate, drs, lcl. frt all'd. lb.	.68	.72	....	.72	....	.65
Trichloroethylene, drs, wks. lb.	.09¼	.10½	.08	.10½	.08	.09
Tricresyl phosphate tks. lb.	....	.32	....	.32	..	.32
Triethylene glycol, drs. lb.	.18½	.19½	.18½	.19½	.18½	.19½
Triphenyl Phos., bbls. lb.	.26	.27	.26	.32	.26	.32
Urea, pure, cases. lb.	....	.12	....	.12	....	.12
Wax, Bayberry, bgs. lb.	no stocks		no stocks		no stocks	
Bees, bleached, U.S.P. cakes. lb.	.65	.70	.68	.72	.60	.70
Candelilla, bgs, crude. lb.	.64	.65	.64	.80	.62	.86
Carnauba No. 1, yellow, bgs, ton. lb.	1.30	1.32	1.30	2.00	1.80	2.04
Xylol, Indus., frt all'd, tks wks. gal.	.23	.25	....	.23	...	.26
Zinc Chloride tech, fused, wks. lb.	.06¼	.0655	.05	.0655	.05	.0535
Oxide, Amer., bgs, wks. lb.	.095	.0975	.09	.09¾	.07	.09¼
Sulfate, crys, bgs. 100 lbs.	4.15	4.90	3.40	4.90	3.40	4.15

OILS AND FATS

Babassu, tks. lb.	....	....	.15	....	.11	.12
Castor, No. 3, drs, c.l. lb.	.29¾	.34¼	....	.34¾	....	.29¾
China Wood, drs, spot NY. lb.	.26	.27	.24	.41	.39	.41
Coconut, edible, drs NY. lb.	no prices		no prices			.0985
Cod, USP, bbls, drs. gal.	2.40	3.50	2.40	3.80	2.15	3.80
Corn, crude, tks, wks. lb.	..	.22½	.27	.37	....	.27
Linseed, Raw, drs, c.l. lb.	.29	....	.334	.3960	.1680	.3640
Menhaden, crude tks.	no prices		.23	nom.	.1220	.21½
Light, pressed, drs l.c.l. lb.	...	.19	....	.29	.1300	.29
Palm, Niger, dms. lb.	no prices		no prices		....	.0865
Peanut, crude, tks, f.o.b. wks. lb.	....	.20	.20	.37	.12⅞	.28½
Perilla, crude, dms, NY. lb.	no stocks		no stocks		no stocks	
Rapeseed, bulks. lb.	no prices		....no prices		....	.13
Red, dms. lb.	.17¾	.21¼	.17¾	.33¾	.13¾	.30¾
Soy Bean, crude, tks, wks. lb.	....	.15¼	.15¼	.33	.1175	.2450
Tallow, acidless, dms. lb.	.19½	nom	.19½	.34½	....	.14¾

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"WE"— EDITORIALLY SPEAKING

EVER HEAR OF ACRONYMS? According to our expert on etymological matters, they are words made up of the first letters of other words, e.g., "snafu" (situation normal, all fouled up). This particularly pernicious form of language-building is now invading science: We were just reading about Britain's first atomic pile, which is a "gleep" (graphite low energy experimental pile).

Incidentally, Commercial Solvents Corp. claims, in its advertisement in the August issue, that "news" is an acronym derived from the initials of North, East, West and South, but we're from Missouri. We figure, after reading the doleful intelligence in a lifetime of morning papers that the word derives from "never ennything worth sayin'."

A MAN WHO HAS the world by the tail—or should we say the head?—is J. F. Hury, division manager of the Houston Oxygen Co. His firm sells oxygen for medicinal purposes, and he's found a really lush market. It seems that oxygen clears the head and drives alcohol out of the blood stream. The "pocket size" (40 cu. ft.) is recommended for weekends, and the "large economy size" (122 cu. ft.) is the thing for serious drinkers.

Chemists will have no use for this, of course, but they might call it to the attention of their sales departments.

OUR ANTIQUARIAN MIND dimly recalls that some Greek once rubbed a stick of amber on a cat's back, whereafter the amber would pick up pieces of paper and behave in an otherwise unconventional manner.

It sure doesn't take long for science to become practical: Now, several centuries later, a plastic whiskbroom is being manufactured. Friction against the fabric generates static electricity which, in turn, picks up the dirt.

It should be especially good—getting back to our original thesis—for brushing cats.

IT'S A LITTLE LATE for this story, now that Congress has adjourned, but we'll proceed anyhow since it has a chemical twist:

During Senate debate on the Kem resolution to investigate the Axtell-Slaughter primary, one of the wags in the press gallery was heard to comment, "They're trying to decide whether to whitewash Truman's district or Kem-tone it."

WE'VE NEVER HAD the pleasure of meeting the Italian gentleman who is apparently a big wheel in the oil industry here in New York. A news report tells us, at least, that the largest oil refinery in Austria, recently seized by the Russians, is "jointly owned by the British Shell Company and the Sacconi Vacuum Company of New York."

THINGS ARE LOOKING UP in South Dakota. Chap out there has finally given concrete reality to a figure of speech long in vogue for referring to useless appendages of any sort. U. S. Patent No. 2,426,002 has been issued to this enterprising and imaginative inventor of—yes, it says so right in the *Official Gazette*—a "Fifth Wheel."

SPEAKING OF ACRONYMS, the commonest ones on the American scene are those derived from corporate names, like Alcoa, or Socony. In our Walter Mittyish imagination we picture ourself as a portly executive—with three secretaries and a rug so thick we have to wear snowshoes—of the Synthetic Products Organization of Kentucky, manufacturers of "Spooky" Brand cosmetics for horror movies.

IT ISN'T AS IF we didn't have enough to worry about already and now another problem is gnawing at our brains about this artificial rain-making with chemicals dropped on clouds. Until now a ball-game, prize-fight or outdoor-concert entrepreneur figured rain was an "act of God" and couldn't do anything about it except curse and lose his shirt.

Now suppose some rain-happy joker drops a few pounds of dry ice on a billowy little cloud right above Soldier Field or Yankee Stadium or a Sunday-school picnic. Can he be sued? For how much? On what grounds? We're going to try to forget about it just as suddenly as we thought of it.

OUR WASP AND MOSQUITO bites seem to sting more and our poison ivy itch more than in previous years. We suspect that Nature has declared war on Man in retaliation for DDT, chlordane, 2,4-D and all the other terrible weapons in Man's armamentarium. A visibly shaken chemical salesman friend of ours reports, on his return from the Maine woods, that the mosquitoes up there are running wind-tunnel tests on a new jet-propelled dive-bomber model.

Looks as if the animal and vegetable worlds are going all out on the old military maxim that the best defense is a good offense.

FIFTEEN YEARS AGO

(From Our Files of September, 1932)

Stock quotations have declined in twenty-two of the twenty-five months since September 1929.

The Committee on Unemployment and Relief for Chemists and Chemical Engineers for the metropolitan area is again appealing to those employed for funds to carry on the work of relief. An amount of $300 a week is necessary.

Standard Oil has answered the oft repeated question, "Of what practical commercial use is the hydrogenation process?" Already a new series of lubricating oils are on the market produced solely by hydrogenation. "Essolube" has been chosen as a trade name.

No marked changes were made in the countries of destination of the chemical exports. Apparently the marked decline in the total figures is due to smaller shipments to all markets, rather than to a loss of any particular market. Canada, the United Kingdom, Germany and Japan continue to be the leading markets.

THIRTY YEARS AGO

(From Our Files of September, 1917)

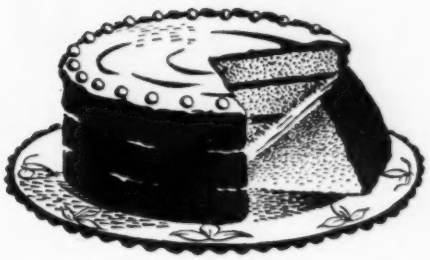
The Chamber of Commerce of Paris is sending out announcements of the French Government's plans to break German monopoly in dye, chemical and pharmaceuticals manufacturing and after the war to fill foreign as well as domestic markets with "Made in France" products.

Monsanto plans a $1,500,000 plant in East St. Louis, and Stauffer Chemicals authorizes expenditure of $100,000 for new buildings at Vernon, Cal.

Adolf von Baeyer died last week in Munich.

What helps you...

eat



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Printed copies of U. S. patents are available from the Patent Office at 25 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

Requests for further information or photostated copies of Canadian patents should be addressed to the Commissioner of Patents and Copyrights, Department Secretary of State, Ottawa, Canada.

U. S. Patents from Official Gazette—Vol. 598, Nos. 1, 2, 3, 4 (May 6-May 27)
Canadian Patents Granted and Published July 1-July 22, 1947.

*Inorganic

Recovering boron fluoride from normally gaseous hydrocarbon mixtures containing same in free form. No. 2,419,504. Walter A. Schulze and William Nelson Axe to Phillips Petroleum Company.

Recovery of fluorine in form of hydrofluoric acid from hydrocarbon material containing fluorine in form of organic fluorine compound, comprises defluorinating hydrocarbon material by contact with porous metal oxide, removing fluorine as hydrofluoric acid by treating defluorinating agent with superheated steam, etc. No. 2,419,558. James D. Gibson to Phillips Petroleum Company.

Manufacture of sulfamic acid steps of mixing urea and sulfamic acid to form paste, introducing sulfuric acid and sulfur trioxide while cooling mass to inhibit formation of sulfamic acid and give wet reaction mass, heating reaction mass to convert to dry sulfamic acid. No. 2,419,618. Howard R. Wilson to E. I. du Pont de Nemours & Co.

Castable insulating refractory mix comprising 76% to 82% by volume of insulating refractory grog particles; from 16.5% to 23% binder including fire clay and hydraulic cement; from .5% to 1% of inorganic suspending colloid; from .05% to .0125% wetting agent. No. 2,419,684. Norman A. Johnson and Paul H. Stern to Armstrong Cork Company.

Inhibiting glass-dissolving action of aqueous alkali solutions in which caustic alkali is principal solute present in amount of 1 to 10% by weight comprising addition of water soluble beryllium compound of .05% to 11.4% of BeO equivalent weight on basis of NaOH content. No. 2,419,805. Walter F. Wegst, Leslie R. Bacon and Thomas H. Vaughn to Wyandotte Chemical Corp.

Fluorine gas storage vessel including storage space defined by metal of group of nickel, copper and alloy of nickel and copper containing excess of 60 per cent copper and continuous adherent coating on inner surface of metal composed of stable fluoride of metal, impenetrable and nonreactive to fluorine gas. No. 2,419,915. Homer F. Priest and Aristid V. Grosse.

Producing magnesium cyanide includes bringing together magnesium metal and hydrocyanic acid in presence of liquid ammonia, separating formed magnesium cyanide ammoniate from liquid mixture, deammoniating magnesium cyanide ammoniate. No. 2,419,931. Albert R. Frank and Robert B. Booth to American Cyanamid Company.

Canadian

Process of producing a storage-stable hydrated lime product capable of rapidly forming a gel on admixture with water. No. 442,028. Canadian Gypsum Company, Ltd. (United States Gypsum Company, Bruce E. Kester).

Process of making calcium sulphate in the anhydrite form. No. 442,347. The Sherwin-Williams Company (Andrew T. McCord and Harold F. Saunders).

*Medicinal

Converting starting estratriene compound having double bond in ring B to compound saturated in ring B and having nucleus and steric configuration of estradiol, comprising saturating double bond in ring B of starting compound by adding two hydroxyl groups at olefinic double bond, dehydrating product, replacing ketonic oxygen in 7-position with hydrogen. No. 2,418,603. Erwin Schwenk and Edith Bloch and Bradley Whitman, to Schering Corporation.

Producing pantothenic acid. No. 2,418,902. Dilworth T. Rogers to American Cyanamid Company.

Germicidal solutions of phenyl mercury compounds. No. 2,418,986. Guy Rampel.

Preparing sulfanilyl-ethanolamide ascorbate comprises heating sulfanilyl-ethanolamide with ascorbic acid in dry methyl alcohol, adding organic solvent miscible with alcohol separating precipitated ascorbate. Product obtained by reaction of sulfanil-N¹-alkylolamide with ascorbic acid. No. 2,419,230. Simon L. Ruskin to Frances R. Ruskin.

*Metals, Ores

Improving properties of ferroso-ferric oxide for use in magnetic body comprising heating finely divided ferroso-ferric oxide in excess of 700°C. in inert atmosphere. No. 2,418,467. William C. Ellis and Alexander G. Souden to Bell Telephone Laboratories, Incorp.

Bearing formed alloy composed of 0.5 to 45% thallium by volume and balance all aluminum, bearing characterized by low coefficient of friction and good resistance to corrosion. No. 2,418,881. Franz R. Hensel and Earl I. Larsen to P. R. Mallory & Co., Inc.

Improving corrosion resistance of steel articles, comprises subjecting steel article to moisture vapor treatment, subjecting moisture vapor coated steel article to vapors of volatile hydrocarbon silicon halide to form hydrocarbon silicon coating thereon, etc. No. 2,418,935. Gilbert E. Hutchinson to Remington Arms Company, Inc.

Removing from magnesium surface roll coatings and similar foreign materials comprises contacting surface with aqueous solution containing from 5 to 25 per cent, by weight of acid sulphate of alkali metal and from 0.2 to 15 per cent, by weight of soluble sodium polyphosphate. No. 2,418,955. Roy Shawcross to Aluminum Company of America.

Process of electrolytically depositing iron and iron alloys. No. 2,418,970. Louis J. Donroe to Pyrene Manufacturing Company.

Electroplating metal selected from group consisting of magnesium and alloys of magnesium comprises contacting metal with bath comprising compound selected from monobasic unsaturated acids containing at least one double bond, aliphatic esters of said acids, and heavy metal salts of said acids, etc. No. 2,419,190. Harvey Eugene Wagoner to E. I. du Pont de Nemours & Company.

Plating with nickel-zinc alloy includes making articles cathode in electrolyte, having pH between 1 and 3, in which nickel chloride and zinc salt of zinc sulphate and zinc chloride have been dissolved, passing current having density of 100 to 700 amperes to square foot of cathode surface through electrolyte to articles. No. 2,419,231. Donald H. Schantz to Standard Steel Spring Company.

Preventing deterioration of electrodes used in salt baths for heat treatment of metal articles, comprising shield formed of chrome-magnesite cement in fixed surface contact with electrode enclosing portion of electrode, extending below liquid level in bath and above for distance beyond portion normally affected by liquid. No. 2,419,383. Frank C. Ames.

Alloy anode for electrodeposition of zinc from zinc sulphate solution, consisting of lead alloyed with small amounts of tin and cobalt and to 1% silver. Electrodeposition of zinc, comprises causing deposition of zinc from zinc sulphate solution with anode consisting of alloy of lead, with small amounts of tin and cobalt and to 1% silver. No. 2,419,722. Sherwin P. Lowe, Matthew K. T. Reikie, George H. Kent and George W. Long to Hudson Bay Mining and Smelting Co., Ltd.

Canadian

Method of producing a dense, thin abrasion and corrosion-resistant coating upon articles of magnesium and magnesium-base alloys. No. 441,879. The Dow Chemical Co. (Herbert K. DeLong).

Flux for melting light metals having a composition within the following range, magnesium chloride 11-18%, calcium chloride 40-46%, sodium chloride 25-30%, and potassium chloride 9-16%. No. 441,898. Magnesium Elektron, Ltd. (Harry Rowland Leech).

*Organic

Isomerized fatty acid esters. No. 2,418,454. Laszlo Auer.

Insect control comprises contacting insect with bi-molecular condensate obtained by condensing keto-enol and phenol. No. 2,418,458. Euclid W. Bousquet to E. I. du Pont de Nemours & Company.

Insect control comprises contacting bi-molecular condensate of acetone and m-cresol. No. 2,418,459. Euclid W. Bousquet to E. I. du Pont de Nemours & Company.

Preparing zinc dicyanimide included reacting soluble metal salt of dicyanimide with soluble zinc salt in presence of water to precipitate zinc dicyanimide. No. 2,418,476. Daniel E. Nagy and Bryan C. Redmon to American Cyanamid Company.

N-(acetylthiomethyl)carbonylamide, the carboxylic acid radical of amide being one to seven carbon atoms. No. 2,418,497. William James Burke to E. I. du Pont de Nemours & Company.

Heterocyclic compound having methoxymethylthio radical attached to 2-carbon atom of five membered ring selected from thiazole ring and thiazoline ring. No. 2,418,499. William James Burke to E. I. du Pont de Nemours & Company.

Alkoxy benzoates of N(hydroxy ethyl) and N(hydroxy phenethyl) substituted amino alcohols. No. 2,418,501. Walter G. Christiansen and Sidney E. Harris to E. R. Squibb & Sons.

Production of chromium complex compound incapable of precipitating chromium upon addition of excess of alkali thereto comprises cooling phenol sulfonate, condensing formaldehyde therewith, reacting hexavalent chromium compound with sulfonated phenol formaldehyde condensation product. No. 2,418,528. Edwin A. Robinson and Ralph M. Beach to National Oil Products Company.

Preparation of 4-amino-5-phenyl-pyrimidine comprises heating alpha-iminomethylbenzyl cyanide with formamide and recovering 4-2mino-5-phenylpyrimidine. No. 2,418,548. William Harris Davies and Alan Woodworth Johnson to Imperial Chemical Industries, Limited.

Production of nitriles, improvement comprises reacting propylene with ammonia in presence of catalyst of cobalt and nickel at 650 to 800°F. and 1000 to 3000 pounds per square inch. No. 2,418,562. John W. Teter to Sinclair Refining Company.

Producing di-alkyl aromatic hydrocarbon comprises reacting monoalkyl aromatic hydrocarbon in presence of catalyst comprising composite of silica and alumina. No. 2,418,689. Wayne L. Benedict and William J. Mattox to Universal Oil Products Company.

2-acetoxy-4-methyl-1,3-pentadiene. No. 2,418,708. Bernard H. Gwynn and Edward F. Degering to Purdue Research Foundation.

Removing free acid from castor oil of type that forms stable emulsions with water consists in bringing into contact with oil neutralizing agent in aqueous solution, bringing oil together with soap stock formed therein into contact with minimum quantity of fuller's earth capable of removal of soap stock. No. 2,418,819. George F. Coggins and John Francis Ahearn to Aerovox Corporation.

Preparing liquid to solid alkyl chlorides of formula $H(CH_2CH_2)nCl$, etc. No. 2,418,832. William E. Hanford and Jesse Harmon to E. I. du Pont de Nemours & Company.

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* *U. S. Patents from Vol. 597, Nos. 2, 3, 4, 5.*
Canadian from June 3-June 24, 1947.

Obtaining substituted cyclopentenone comprises heating, under superatmospheric pressure, at 125°C. to 250°C., carbon monoxide in contact with substituted butadiene-1,3 having formula described in patent. No. 2,418,850. Maynard S. Raasch and Clement W. Theobald to E. I. du Pont de Nemours & Co.

Reconstitution of glycerides. No. 2,418,898. John Francis Murphy and Ernest K. Holt to Levers Brothers Company.

In catalytic process for synthesizing hydrocarbons by hydrogenation of carbon oxide, method comprises continuously passing to reaction zone reactant feed comprising carbon monoxide, hydrogen and isoparaffin hydrocarbon having from 4 to 6 carbon atoms per molecule, etc. No. 2,418.899. Ernest Frank Pevere, George Bates Hatch and Eugene Edward Sensel to The Texas Company.

Dispersing gel of oil of class consisting of drying and semi-drying oils in oil of said class with aid of small amount of heterocyclic organic nitrogen compound as dispersing agent. No. 2,418,920. Henry G. Berger, George S. Crandall and John F. Socolofsky to Socony-Vacuum Oil Company.

Gelling oil of class consisting of oiticica oil, perilla oil, dehydrated castor oil and mixtures of oils with less than equal quantity by weight of linseed oil by treating said oil with gelation catalyst of class consisting of hydrogen fluoride and boron fluoride. No. 2,418,921. Henry G. Berger and George S. Crandall and John F. Socolofsky to Cocony-Vacuum Oil Company.

5-keto-2,4,6,8-tetrahydroimidazolo [4,5-C] thiophenes and process for preparing. No. 2,418,823. Seymour Bernstein and Bernard R. Baker and Sidney R. Safir to American Cyanamid Company.

Ureylene carbocyclic compounds and their preparation. No. 2,418,925. Richard C. Clapp and Richard O. Roblin, Jr., to American Cyanamid Company.

Reaction product of alkaline thiosulfate and saturated macromolecular organic compound having at least one recurring unit linked together in chain-like fashion in molecule, average molecular weight in excess of 1000, reactive ester group of class which consists of halogen esters, sulfate esters and sulfonate esters. No. 2,418,940. Emmette F. Izard to E. I. du Pont de Nemours & Company.

Isothiourea derivative of macromolecular organic compound having at least one recurring unit linked together in chain-like fashion in molecule, average molecular weight in excess of 1000, and at least one reactive ester group selected from halogen esters, sulfate esters and sulfonate esters. No. 2,418,941. Emmette F. Izard and Benjamin W. Howk to E. I. du Pont de Nemours & Company.

Reacting hydrogen sulfide in presence of pyridine with cellulose acetate p-toluene sulfonate, etc. No. 2,418,942. Paul W. Morgan to E. I. du Pont de Nemours & Company.

Preparing aromatic substituted guanides comprises mixing together in mutual solvent aromatic acyl guanylurea having formula described in patent. No. 2.418,944. Donald W. Kaiser and Jack T. Thurston to American Cyanamid Company.

N⁴(mercapto-acyl)-(p-amino-benzene-sulfonamides) and method of preparing same. No. 2,418,947. William A. Lott and Kathryn A. Losee and Andrew Ellis O'Keeffe to E. R. Squibb & Sons.

Esters of Omega-cyanoguanyliminodithio-carbonic acid. No. 2,418,959. Jack T. Thurston and Donald W. Kaiser to American Cyanamid Company.

Producing 3-bromopyridine and 3,5-dibromopyridine, consists in putting liquid bromine and solid pyridine hydrochloride together, heating mixture at atmospheric pressure first to 160°C. then to 195-200°C. until at each temperature evolution of hydrogen chloride ceases, heating mixture further at diminished pressure to distil from 3,5-dibromopyridine and 3-bromo-pyridine. No. 2,418,977. Samuel M. McElvain and Melvin A. Goese.

In isolation of chrysene from a chrysene-containing material, improvements comprise subjecting material to solvent action of normally liquid substance containing pyridine nucleus and boiling below about 237°C., recovering solid phase containing chrysene. No. 2,419,011. Gerard W. Curtis to Allied Chemical & Dye Corporation.

Preparation of tartaric and oxalic acid values comprise adding to reaction zone over extended period of time, water, residue of the type hereinafter described, nitric acid, carbohydrate material oxidizable in solution by nitric acid to tartaric acid and selected from glucose, fructose, pentoses, gluconic acid, erythritol, keto-gluconic acids, and materials rapidly hydrolyzable to these, and catalyst directive for tartaric acid preparation, etc. No. 2,419,019. Ralph A. Hales to Atlas Powder Company.

Removal of oxalic and tartaric acids from aqueous solution resulting from nitric acid oxidation of carbohydrate materials. No. 2,419,020. Ralph A. Hales to Atlas Powder Company.

In catalytic vapor phase dehydration of pinacol to 2,3-dimethylbutadiene-1,3 at elevated temperatures, improvement comprises maintaining reaction chamber surfaces made of non-ferrous metal comprising predominantly nickel in contact with reactants at elevated temperatures. No. 2,419,030. Julian A. Otto and Albert E. Anderson to General Chemical Company.

Cyclic process for production of tartaric and oxalic acid values. No. 2,419,038. Marshall T. Sanders to Atlas Powder Company.

Obtaining isophorone and acetone comprises contacting in liquid phase acetone auto-condensation products consisting of compounds having higher boiling point than isophorone with aqueous solution containing 0.5% to 25% by weight of alkali metal hydroxide at 130°C. to 235°C. No. 2,419,051. Seaver A. Ballard and Vernon E. Haury to Shell Development Company.

Unsaturated ethers of cyclic sulfones. No. 2,419,082. Rupert C. Morris and Edward C. Shokal to Shell Development Co.

Catalytic hydrogenation of cuminic acid compounds. No. 2,419,093. Frank K. Signaigo and Caryl Sly to E. I. du Pont de Nemours & Company.

In carboxylation of iso-olefins selected from isobutylene, triisobutylene and vinyl cyclohexene with carbon monoxide at 50 to 200°C. and under pressure between 100 and 1500 atmospheres, step comprises conducting reaction in presence of from 64 to 84% aqueous sulfuric acid. No. 2,419,131. Thomas A. Ford to E. I. du Pont de Nemours & Company.

Inhibiting development of foreign taste and odor in hydroxyacetic acid when in contact with chrome-alloy steels, comprises incorporating in hydroxyacetic acid at least 0.0002% of copper ions based on weight of hydroxyacetic acid. No. 2,419,137. Harry C. Hetherington to E. I. du Pont de Nemours & Company.

Dehydrating ketones comprises reacting alkyl ketine absence of free hydrogen at 150° to 450° C. in presence of catalyst prepared by treating with reducing gas composite comprising copper oxide, zinc oxide, and alumina. No. 2,419,142. Vladimir N. Ipatieff and Carl B. Linn to Universal Oil Products Company.

In preparation of salts of ethylenebisiminodiacetic acid step comprises reacting ethylene dihalide with iminodiacetic acid in presence of acid-binding agent in aqueous solution whereby product containing salt of ethylenebisiminodiacetic acid is obtained. No. 2,419,157. Edryd Gwylfa Parry to Imperial Chemical Industries, Limited.

Producing vanillic acid from vanillin, comprises reacting silver oxide in water with alkali hydroxide and vanillin. No. 2,419,158. Irwin A. Pearl to Sulphite Products Corp.

Production of vinyl cyanide comprises reacting acetylene with hydrogen cyanide in vapor phase in presence of catalyst comprising alkali metal cyanide supported on inert carrier having surface activity of less than 10 minutes (standard chloropicrin test). No. 2,419,186. Charles R. Harris and William C. Sharples to E. I. du Pont de Nemours & Company.

Splitting off hydrogen halide from organic compounds in which halogen has replaced hydrogen attached to carbon, comprising contacting compounds, in absence of solvents with iodized magnesium as dehydrohalogenation catalyst, while compounds are at temperature to initiate reaction accompanied by evolution of hydrogen halide. No. 2,419,198. Roy E. Bowman.

Quinoline compounds and process of making. No. 2,419,199. Joseph H. Burckhalter, Albert L. Rawlins, Frank H. Tendick, Eldon M. Jones, and Walter F. Holcomb to Parke, Davis & Co.

Acridine compounds and process of making. No. 2,419,200. Joseph H. Burkhalter, Albert L. Rawlins, Frank H. Tendick, Eldon M. Jones, and Walter F. Holcomb to Parke, Davis & Co.

Separating resin acids from tall oil comprises dissolving tall oil in organic solvent selected from acetone, isopropanol, Hi-Flash naphtha and gasoline, precipitating resin acids from solution with primary organic amine selected from cyclohexylamine, p-dodeca-hydroxyenylamine and 2-amino-2-methyl-1-propanol. No. 2,419,211. George C. Harris to Hercules Powder Company.

Compound of group consisting of 3-hydroxy-Δ-11,12-cholenic acid and alkyl and aryl esters of carboxyl group thereof. No. 2,419,220. Edward C. Kendall to Research Corporation.

Copolymers of 2-halogeno-allyl alcohol or 2-halogeno-allyl esters. No. 2,419,221. William O. Kenyon and John H. Van Campen to Eastman Kodak Company.

Recovering HCN free from H_2S from fuel gas comprising, absorbing HCN and H_2S from fuel gas by aqueous scrubbing liquid, stripping HCN and H_2S, passing stripped gases to selective absorbing zone, to absorb all HCN and small amount H_2S; rectifying absorbent solution, etc. No. 2,419,225. John Mitchell, William H. Hill and Herbert A. Gollmar to Koppers Company, Inc.

Recovery of hemimellitene. No. 2,419.247. Stanley Francis Birch and Raymond Arthur Lowry to Anglo-Iranian Oil Company, Limited.

Preparing 5-diethylamino-2-pentanone comprises heating mixture, containing not more than 0.5% water, acetylpropyl chloride and diethyl amine until reaction is complete, liberating free amines from salts with aqueous caustic, distilling off diethyl amine, separating supernatant layer, fractionating layer to recover desired product. No. 2,419,259. Sylvan E. Forman to U. S. Industrial Chemicals, Inc.

Production of 1,3-butylene glycol. No. 2,419,275. Floyd J. Metzger to Air Reduction Company, Inc.

Making N-isopropyl benzothiazyl sulfenamide by oxidative condensation between isopropylamine and water-soluble salt of mercapto benzothiazole, in aqueous solution, step of adding to aqueous solution containing salt, sodium sulfate, prior to adding the oxidizing agent. No. 2,419,283. Philip T. Paul and Byron A. Hunter to United States Rubber Company.

Converting aldol to 1,3-butylene glycol comprises subjecting aldol to hydrogenation catalyst in lump form in presence of hydrogen has withdrawing resulting product, cooling portion, resulting withdrawn cooled portion to catalyst, subjecting remainder to further reaction in presence of hydrogenation catalyst and hydrogen. No. 2,419,300. Richard C. Tollefson to Air Reduction Company.

Chemical compounds selected from bases represented by formula X—NH—Y and salts thereof in which X represents mono nuclear p-amino-aryl radical of benzene series and —NH—Y represents residue of heterocyclic compound selected from 6-amino-benzo-para-dioxan and 7-amino-benzo-para-dioxeno-para-dioxan. No. 2,419,334. Robert C. Conn and Frederick H. Adams and John P. Goulding to American Cyanamid Company.

Separating and recovering butadiene from mixture of four-carbon hydrocarbons having same boiling points, including butadiene, butylenes and butanes, comprises bringing mixture of hydrocarbons in gaseous state into contact with liquid nitroparaffin of formula R—NO_2 wherein R is alkyl group containing less than six carbon atoms, recovering enriched butadiene from nitroparaffin. No. 2,419,335. David Craig to The B. F. Goodrich Company.

Arsenic compounds of phenyl-hy-drazo-naphthol sulfonic acids. No. 2,419,348. Ernst A. H. Friedheim.

Butadiene desorption method. No. 2,419,350. Richard A. Given to Standard Oil Development Company.

(N'-alkylpiperazino) alganol esters. No. 2,419,366. Elmore Hathaway and Martin Everett to American Cyanamid Company.

Surface active agent, method comprises reacting aliphatic polyamine with carbon dioxide, mixing product with higher fatty acid, heating resulting mixture. No. 2,419,404. James M. Johnson to Nostrip, Inc.

Preparing 1-hydroxy-4-aryl-aminoanthraquinones comprises reacting mixture quinizarin and leuco quinizarin, with arylamine in presence of boric acid and solvent of alcohols and water. No. 2,419,405. David X. Klein to E. I. du Pont de Nemours & Co.

Preparing amines and nitriles from olefins and ammonia. No. 2,419,470. John W. Teter to Sinclair Refining Company.

Production of monohalo derivative of unsaturated nitrile comprises reacting mixture of acetylenic hydrocarbon and cyanogen halide at 20° to 400° C. No. 2,419,488. Harris A. Dutcher to Phillips Petroleum Company.

Extracting olefins from olefinic hydrocarbon mixture comprises extracting hydrocarbon mixture containing mono-olefins and di-olefins with furfural at elevated temperatures in presence of small amount of compound having at least one phenylamino group and selected from N-phenyl substituted thioureas, guanidines and naphthylamines sufficient to inhibit polymer formation, etc. No. 2,419,499. Johan C. D. Oosterhout and Thomas C. Roddy, Jr. to The Texas Company.

Producing saturated halide comprises reacting saturated halide of lower molecular weight having halogen atom attached to tertiary carbon atom with mono-olefin in presence of liquid organic complex of Friedel-Crafts type metal halide catalyst containing added amount of metal halide. No. 2,419,500. Walter H. Peterson and Kenneth D. Detling to Shell Development Company.

Synthesis of cyclic ketals from polyhydric alcohols and acetone, improvement comprising reacting polyhydric alcohol selected from unsubstituted, chloro-substituted, and nitro-substituted polyhydric lower alkanols having hydroxyl groups on adjacent carbon atoms, and unsubstituted polyhydric lower alkanols having hydroxyl groups on alternate carbon atoms with acetone in presence of ketalization catalyst and compound selected from chloro- and bromo-hydrocarbons, etc. No. 2,419,505. Murray Senkus to Commercial Solvents Corporation.

Alkyl and hydroxyalkyl nitro amines and process for preparing. No. 2,419,506. Murray Senkus to Commercial Solvents Corporation.

Preparation of 1,3-butylene glycol. No. 2,419,515. I. Louis Wolk to Phillips Petroleum Company

Dialkyl-dihydroxy-diphenyl-hexadienes and their derivatives. No. 2,419,516. Albert Bloom and Victor Niederl to Reed & Carnick.

Recovery of nitration-pure aromatic hydrocarbon of benzene series from oil containing same and containing higher, lower and like-boiling, non-aromatic hydrocarbons, including substantial proportion of like-boiling olefins. No. 2,419,521. John W. Waldron to Allied Chemical & Dye Corporation.

Production of hydantoin, steps of heating hydantoic acid with 3 normal aqueous mineral acid solution, to between 80° and 130° C., cooling to crystallize hydantoin, separating crystalline hydantoin from acidic mother liquor, etc. No. 2,419,530. Edgar C. Britton, John E. Livak and Maxton F. Murray to The Dow Chemical Company.

Method comprises admixing equimolecular amounts of aluminum chloride, aryl halide, and phenol having formula described in patent. No. 2,419,553. Thomas Houtman, Jr. to The Dow Chemical Company.

Production of monoalkyl drivative of alkylatable aromatic hydrocarbon, comprises passing hydrocarbon mixture comprising olefin hydrocarbon through bed of solid granular catalyst to form monoalkyl derivative catalyst comprising silica and of oxide of metal selected from groups III B and IV A of periodic system. No. 2,419,599. Walter A. Schulze to Phillips Petroleum Company.

Alkylation of cyclic hydrocarbon, comprises subjecting alkylatable cyclic hydrocarbon and alkylating agent under alkylation conditions to catalyst comprising aluminum chloride-hydrocarbon complex formed by interaction of aluminum chloride and aliphatic olefin. No. 2,419,632. Roland B. Day to Universal Oil Products Company.

Producing poly-alkylated cyclic compound comprises subjecting cyclic terpene compound at reaction temperature in presence of hydrogen halide to action of catalyst consisting of at least one refractive oxide selected from alumina, boria, silica, zirconia and titania. No. 2,419,690. Herman Pines and Vladimir N. Ipatieff to Universal Oil Products Company.

Producing aromatic nitrosamine comprises preparing reaction mixture containing secondary diaryl amine of formula described in patent. No. 2,419,718. Henry J. Kehe to The B. F. Goodrich Company.

Secondary amine product obtained by condensing diarylamine containing only carbon, hydrogen and nitrogen, having all its nitrogen present in secondary amine group, with hydrocarbon containing acetylenic linkage, in presence of acidic condensation catalyst. No. 2,419,736. Arthur W. Sloan to The B. F. Goodrich Company.

Ester derivatives of lignin sulphonates. No. 2,419,783. Kermit Longley to Quaker Chemical Products Corp.

Production of ethyl benzene from benzene and ethylene comprises passing liquid stream of benzene and ethylene through solid granular adsorbent contact catalyst contained in reaction zone, consisting of synthetic silica gel subsequently promoted by minor proportion of alumina, etc. No. 2,419,796. Walter A. Schulze to Phillips Petroleum Company.

Amidization of pyridine monocarboxylic acid compounds of class of pyridine monocarboxylic acids and their ammonium salts, comprises reacting compound with urea presence of catalyst containing element from groups V and VI of Mendeleeff periodic system having atomic number between 15 and 92 inclusive, recovering amide from reaction mass. No. 2,419,831. Paul W. Garbo.

Adding carbalkoxy group to ethyl phenylacetate, improvement comprises reacting mixture of ethyl phenylacetate in excess of diethyl carbonate with sodium at 115°-120° C. No. 2,419,865. Arthur W. Weston and Walter H. Hoffman to Abbott Laboratories, Inc.

Arylides of ortho-hydroxy carboxylic acid. No. 2,419,932. Harry Wilhelm Grimmel and Alfred Guenther to General Aniline & Film Corp.

Canadian

Process for preparing amine salts of dithiofuroic acid by reacting a mixture of furfural, sulphur. a primarily aliphatic amine and hydrogen sulphide. No. 441,959. Wingfoot Corporation (Albert Foster Hardman).

Monochloro para-xylylene dichloride. No. 442,212. Canadian Industries Ltd. (Oliver Wilfred Cass).

Composition of matter comprising an amyl imide of 3,6-endomethylene-4-cyclohexene-1,2-dicarboxylic acid. No. 442,216. Canadian Industries Ltd. (Euclid Wilfred Bousquet).

An alkylsulphenyl dimethyldithiocarbamate. No. 442,221. Canadian Industries, Ltd. (Madison Hunt).

Monomeric styrene composition consisting of monomeric styrene and a phenol selected from the class consisting of para-aminophenol, para-tertiary-butylphenol, ortho-hydroxybiphenyl and 2-amino-5-hydroxybiphenyl. No. 442,478. Monsanto Chemical Company (Rudolph L. Heider)

Producing mono-alkylbenzene by reacting together in the presence of a dissolved hydrogen chloride and a Friedel-Crafts catalyst a mixture of benzene and polyalkyl benzenes with olefinic gases. No. 442,479. Monsanto Chemical Company (Edward N. Rosenquist and Roy W. Sufoff).

Photo-chemical production of halogenated thio-ethers. No 442,501 Shell Development Company (Frederick F. Rust and William E. Vaughan).

*Paints, Pigments

Flatting agent, comprises particles of modified rosin soap coated with film-forming substance. No. 2,418,450. Laszio Auer to Interchemical Corporation.

Orienting ferromagnetic flakes in paint films. No 2,418,479. Burt Carlton Pratt and Paul L. Salzberg to E. I. du Pont de Nemours & Company.

Metal-protective pigment composition consisting of mixture of ammonium ferrous phosphate in flake-like, crystalline form and zinc yellow, ammonium ferrous phosphate component of mixture ranging from 5% to 30% by weight of total pigmenting ingredients and major portion of iron content being in ferrous state. No. 2,419,017. Godfrey Grimm to E. I. du Pont de Nemours & Company.

Novel paint composition substantially non-thixotropic by reason of water content therein, comprising water containing oleo-resinous paint normally thixotropic as result of absorbed water content and from 0.065% to 0.28% of alkali metal petroleum mahogany sulfonate for every 0.5% of water content calculated on weight of total paint composition. 2,419,048. Harlan E. Althouse to L. Sonneborn Sons, Inc.

Producing cracking-resistant pigment composition comprises calcining in presence of oxidizing agent and at 1050°C. to 1150°C. mixture consisting of chromite ore, alkaline earth compound, etc. No. 2,419,094. Clifford Kanne Sloan to E. I. du Pont de Nemours & Company.

Making lead pigments by chemical combination of lead and acidic oxides in solid phase comprises intimately blending by milling together metallin lead and compounds which upon heating will supply oxides which are acidic in relation to lead oxide, heating mixture in oxidizing atmosphere. No. 2,419,246. Louis E. Barton.

Producing carbon black comprising continuously introducing reactant hydrocarbon in gaseous state into cylindrical combustion chamber introducing combustible mixture and burning to partially preheat reactant hydrocarbon passing partially heated reactant hydrocarbons, flame and combustion products into intermediate chamber, into reactor chamber, etc. No 2,419,565. Joseph C. Krejci to Phillips Petroleum Company.

Canadian

Improving the alkali resistance of iron blue pigments by wet mixing an iron blue pigment with from 2 to 20 percent of nickel ferrocyanide. No. 441,891 Interchemical Corp. (Irving Shack, Edwin A. Wilson).

Weather-resisting paint consisting of: white lead 25 lbs., linseed oil 2 gals., boracic acid 1 lb., and water 2 gals. No. 442,141 Yves Arcand.

*Paper, Pulp

Defibering paper stock, in combination tank, impeller mounted for rotation in tank, comprising disk having multiplicity of vanes discharge stock outwardly, tank having discharge opening below impeller and sloping bottom, etc. No. 2,418,547. Edwin Cowles to The Cowles Company.

Treating water-wet oil sands for increasing effective permeability to oil, comprises contacting sands with hydrocarbon oil solution of organic heterocyclic polycyclic amine of class of quinoline and its homologs, which does not affect water-oil interfacial tension. No. 2,419,755. Frederik W. Albaugh to Union Oil Company of California.

Synthesizing hydrocarbons boiling within narrow range comprises contacting isoparaffinic and olefinic hydrocarbons with mineral acid alkylation catalyst withdrawing reaction mixture, supplying withdrawn mixture to second contacting zone, commingling between 0.1 and 1.5% benzene. No. 2,419,692, Bernard H. Shoemaker and Bernard L. Evering to Standard Oil Company.

Isomerization process comprises passing paraffinic hydrocarbons with hydrogen halide promoter under isomerizing conditions through series of reaction zones containing metal halide isomerizing catalyst of increasing activity in direction of flow. No. 2,419,667. Thomas J. Williams to Universal Oil Products Company.

Mineral oil comprising viscous mineral oil fraction having in admixture minor proportion, to stabilize oil fraction, of non-corrosive, sulfurized aliphatic ketone obtained by sulfurizing unsaturated aliphatic ketone with elementary sulfur at elevated temperature. No. 2,419,586. Ferdinand P. Otto and Ronald E. Meyer to Socony-Vacuum Oil Company, Inc.

Mineral oil comprising viscous mineral oil fraction containing minor proportion of stable, oil-soluble, phosphorous- and sulfur-containing reaction product obtained by reaction of phosphorous penta-sulfide and hydrocarbon stock. No. 2,419,584. Thomas T. Noland to Socony-Vacuum Oil Company.

Converting heavy high boiling hydrocarbon oil into high quality gasoline by catalytic cracking in presence of particle form solid catalytic contact mass. No. 2,419,519. Louis P. Evans to Socony-Vacuum Oil Company, Inc.

Converting heavy high boiling hydrocarbon oil into high quality gasoline by catalytic cracking in presence of particle form solid catalytic contact mass. No. 2,419,517. Sylvander C. Eastwood to Socony-Vacuum Oil Company, Incorp.

Conducting cyclic operation at closely controlled elevated temperatures comprising catalytic petroleum conversion reaction, etc. No. 2,419,507. Thomas P. Simpson, John W. Payne and John A. Crowley, Jr. to Socony-Vacuum Oil Company.

In manufacture of high anti-knock gasoline from high boiling petroleum oils, improvement comprises mixing finely-divided adsorptive catalyst with oil to be cracked, passing mixture under super-atmospheric pressure and at velocity adequate to maintain catalyst in admixture with the oil through cracking zone separating mixture discharged from cracking zone into composite gas-vapor mixture, etc. No. 2,419,427. John W. Teter to Sinclair Refining Company.

Isomerization of normal paraffin hydrocarbons. No. 2,419,423. Eugene E. Sensel, Harold V. Atwell and Arthur R. Goldsby to The Texas Company.

Preparing catalyst for hydrocarbon conversion comprises impregnating carrier with aqueous solution of compound of element from group of chromium, molybdenum and vanadium, drying, wetting with nonaqueous nonionizing organic liquid, admixing oxide of barium, heating to volatilize liquid and further heating in oxdizing atmosphere. No. 2,419,343. Kenneth C. Edson and Frank E. Fisher to Skelly Oil Company.

Catalyst for hydrocarbon conversion consisting of 84% by weight of carrier, 8% of oxide from group of chromium oxide, vanadium oxide and molybdenum oxide, and 8% of barium peroxide. No. 2,419,342. Kenneth C. Edson and Frank E. Fisher to Skelly Oil Company.

Conversion of hydrocarbon oils. No. 2,419,323. Richard N. Meinert and Philetus H. Holt, 2nd to Standard Oil Development Company.

Regenerating carbon contaminated catalysts. No. 2,419,245. Maurice H. Arveson to Standard Oil Company.

Process of catalytically reacting gaseous materials and regenerating catalyst wherein reaction and regeneration are performed in separate steps each having cyclic flow of materials therein including upflowing and downflowing columns which have common axis, improvement in imparting mechanical rotative energy to cyclic streams of catalyst and reactant mixtures in respective steps independent energy supplied to feed of materials to respective steps. No. 2,419,098. Charles W. Stratford, Joe A. Altshuler and David H. Putney to Stratford Development Company.

In reacting gaseous hydrocarbons in presence of solid catalyst in reaction zone, improvement resides in establishing cyclic ring of moving catalyst within reaction zone including separated upflowing and downflowing catalyst columns, etc. No. 2,419,097. Charles W. Stratford and David H. Putney to Stratford Development Corp.

Removing porous carbonaceous deposits resistant to action of strong sulfuric acid from surfaces to which they adhere, step comprising reacting within interstices of carbonaceous deposits inorganic carbonate solution and acid having dissociation constant not less than approximately 10^{-8}, generating carbon dioxide gas within interstices. No. 2,419,076. Frank A. Horsley to Shell Development Company.

Extractive distillation of hydrocarbons with furfural-water mixtures. No. 2,419,039. Virgil Scarth to Phillips Petroleum Company.

Producing improved motor fuel comprises contacting first motor fuel of relatively low antiknock value and lead susceptibility and containing sulfur in non-refractory form with reforming catalyst in reforming step under conditions of temperature, pressure and rate of flow such that no cracking takes place but hydrogen is produced and desulfurization occurs, etc. No. 2,419,029. George G. Oberfell to Phillips Petroleum Company.

Continuous method for production of gasoline of high octant number and low degree of unsaturation comprises vaporizing gas oil, adding powdered cracking catalyst to vapors to form suspension of catalyst in vapors, passing suspension through first cracking zone at 800° to 950° F., etc. No. 2,418,993. William J. Sweeney to Standard Oil Development Company.

Stripping of spent catalyst particles in catalytic conversion of hydrocarbon. No. 2,418,890. Robert W. Krebs to Standard Oil Development Company.

Dehydrogenation catalyst consisting of 50-97 parts by weight of ZnO, 3-50 parts metal oxide selected from Fe_2O_3, MnO and Cr_2O_3, 0.5 to 15 parts alkali metal oxide promoter and 1-15 parts of stabilizer preserving

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* *U. S. Patents from Vol. 597, Nos. 2, 3, 4, 5. Canadian from June 3 - June 24, 1947.*

activity of promoter selected from oxides of metal of right hand side of group 1 of periodic system. No. 2,418,888. Kenneth K. Kearby to Standard Oil Development Co.

Treating sour hydrocarbon oil comprises passing oil in presence of added oxidizing agent and added mineral acid successively through turbulent zone and superposed quiescent zone, each consisting of slurry of solid particles comprising mixture of adsorbent material and copper compound suspended in hydrocarbon oil. No. 2,418,884. Charles O. Hoover to Air Reduction Comany.

Determining amount of hydrocarbons having carbon atom with single hydrogen atom linked thereto, in hydrocarbon mixture involving reaction with antimony pentachloride followed by titration with alkali metal bromate solution, step of reacting antimony pentachloride with hydrocarbon mixture in presence of uranyl salt capable of catalyzing reaction at temperature below that at which chlorination of normal paraffin hydrocarbons occurs. No. 2,418,814. George W. Ayers and Erskine E. Harton, Jr. to The Pure Oil Company.

Acid refining viscous hydrocarbon oil with production of acid sludge characterized by ready pumpability, comprises contacting oil with sulfuric acid in presence of added small amount of surface tension reducing agent, settling resultant acid sludge, and separating sludge from oil. No. 2,418,784. Darwin M. McCormick, Carroll B. Barbour and William K. Griesinger to The Atlantic Refining Company.

Isomerization process comprises contacting normally liquid paraffin hydrocarbon and phenolic compound containing hydrocarbon substituent with Friedel-Crafts type isomerizing catalyst under isomerizing conditions. No. 2,418,724. Herman Pines and Richard C. Wackher to Universal Oil Products Company.

Method and apparatus for hydrocarbon conversion. No. 2,418,679. Ernest Utterback to Socony-Vacuum Oil Company, Inc.

Producing coated surface on paper webs which will give mat imprint when printed with non-aqueous base inks, consists in applying water wetting and penetrating agent to surface of web, coating web by printing with mineral coating in aqueous vehicle, drying coating. No. 2,419,206. Harry C. Fisher to Consolidated Water Power & Paper Company.

Treating paper consists in applying aqueous polyvinyl alcohol solution to surface of web, passing through rolls to plastically smooth, imprinting onto web mineral coating in aqueous vehicle, drying and calendering coated product. No. 2,419,207. Harry C. Fisher to Consolidated Water Power & Paper Company.

Canadian

Improved process of digesting cellulosiferous material in the production of chemical pulp. No. 441,890. The Institute of Paper Chemistry (Sidney D. Wells).

*Petroleum

Cracking chemical compounds liquid at atmospheric temperatures and pressures, preheating furnace for vaporizing compounds to be cracked, refractory tube, adjustable burner with nozzle projecting into one end, etc. No. 2,418,506. William F. Fulton to United Gas Pipe Line Company.

Hydrocarbon conversion process. No. 2,418,534. Claude W. Watson to The Texas Company.

Method and apparatus for hydrocarbon conversion. No. 2,418,672. Edward L. Sinclair and William A. Hagerbaumer to Socony-Vacuum Oil Company.

Method of catalytic conversion of hydrocarbons. No. 2,418,673. Edward L. Sinclair and William A. Hagerbaumer to Socony-Vacuum Oil Company.

*Photographic

Gelatino silver halide emulsion containing fog-inhibiting amount of aryl-substituted hydroquinone, being aryl group of benzene series, substituted in at least one of 2,3 and 5 positions of the hydroquinone. No. 2,418,-613. Charles F. H. Allen and Jean E. Jones to Eastman Kodak Company.

Light-sensitive photographic element comprising support having thereon water-permeable colloid layer containing preformed dry having formula described in patent. No. 2,418,624. Jonas John Chechak and Burt H. Carroll to Eastman Kodak Company.

Gelatin-silver halide emulsion containing fog-inhibiting amount of non-waxy aromatic hydrocarbon of benzene series having substituent selected from halogen atoms, unsubstituted phenyl radical, unsubstituted lower alkyl radicals, and halogen substituted lower alkyl radicals. No. 2,418,-629. George E. Fallesen to Eastman Kodak Company.

Photographic silver halide emulsion layer having color forming development component having formula described in patent. No. 2,418,747. Abraham Bavley to General Aniline & Film Corporation.

Photographic silver halide emulsion having incorporated color forming development component, having formula described in patent. No. 2,418,-748. Abraham Bavley to General Aniline & Film Corporation.

Color photography method of removing silver from film after dye-stuff image formation by action of bleaching bath, comprises treating film with bath containing phenoxy alcohol selected from class consisting of formula described in patent. No. 2,419,900. Frank J. Kaszuba to General Aniline & Film Corporation.

*Polymers

Production of spinnable vinyl resin compositions. No. 2,418,507. Roland D. Glenn to Carbide and Carbon Chemicals Corporation.

Gel comprising ethyl cellulose and product obtained by heating between 140°F. and 600°F. alkyl ester of abietic acid agitating in presence of free oxygen containing gas until viscosity at 25°C. has increased 50%, ethoxy content being between 44% and 50%. No. 2,418,583. Mortimer T. Harvey to Harvel Research Corporation.

Treating polymerizable unsaturated alkyd resin having acid number below 150 comprises heating resin with normal propyl alcohol to effect reaction between resin and alcohol, reacting propylized alkyd with acetic anhydride to esterify free hydroxyl groups. No. 2,418,633. Charles Gould to Marco Chemicals, Inc.

Making elastic substance having properties similar to vulcanized natural rubber, comprises milling co-polymer of **methyl** acrylate and maleic anhydride, admixing ethylene glycol, molding heating to 130°C. No. 2,418,688. Francis Clarke Atwood to National Dairy Products Corp.

Resin consisting of reaction product of succinic anhydride, glycerol, and ethylene glycol. No. 2,418,721. Carl Opp to Interchemical Corp.

Producing free-flowing high solids aqueous dispersion of butadiene-styrene copolymer. No. 2,418,782. Jacob G. Mark and David Rubinstein to Dewey and Almy Chemical Company.

Catalytically polymerizing unsaturated hydrocarbon liquid under controlled low temperature conditions comprises continuously moving film of unsaturated hydrocarbon liquid on moving surface within catalytic polymerization zone, etc. No. 2,418,797. Vanderveer Voorhees to Standard Oil Company.

Polymerizing saturated aliphatic alcohol ester of methacrylic acid, comprises forming aqueous dispersion of monomeric saturated aliphatic alcohol ester of methacrylic acid and from 1.0% to 0.005%, by weight of monomer, of benzoyl peroxide, below 80°C. heating to 110°C. No. 2,418,828. David A. Fletcher and Frederick L. Johnston to E. I. du Pont de Nemours & Company.

Composite structure of thermoplastic material, resistant to deformation by puncturing, tearing and stretching forces, comprises at least one flexible, sheet-like element formed from vinyl resin selected from polyvinyl resins produced by conjoint polymerization of vinyl halide with vinyl ester of aliphatic acid, polyvinyl resins of foregoing types, etc. No. 2,418,904. Edward W. Rugeley and Theophilus A. Feild, Jr., to Carbide and Carbon Chemicals Corp.

Preparing solid plastic hydrocarbon interpolymer which is reactive with sulfur to give elastic product comprising reacting together major proportion of aliphatic isoolefin having 4 to 6 inclusive carbon atoms per molecule with minor proportion of conjugated polyolefin having more than 2 double bonds, etc. No. 2,418,912. William J. Sparks and Robert M. Thomas to Standard Oil Development Company.

Sulfur-containing polymeric compounds. No. 2,418,938. Emmette F. Izard to E. I. du Pont de Nemours & Company.

Sulfur-containing polymeric compounds and process for producing same. No. 2,418,939. Emmette F. Izard to E. I. du Pont de Nemours & Company.

Producing electrically insulating articles comprises steps of preparing homogenous mixture consisting of 7 parts of polyisobutylene with 3 parts of mixture consisting of styrene plus 1% of paradivinylbenzol, applying heat until substance produced has soft rubber-like character. No. 2,418,978. Willi Mertens.

Treating wash oil which has been employed in scrubbing gases to recover light oils, wash oil having in use assimilated adulterants of nature of styrene, indene and cyclopentadiene which are polymerizable, consists in adding caustic soda to wash oil, heating, agitating mixture, separating adulterants which are polymerized. No. 2,418,988. Daniel K. Segur to Donner-Hanna Coke Corporation.

Resin comprising polymer of ether of 3-sulfolanol, structural formula described in patent. No. 2,418,991. Edward C. Shokal and Rupert C. Morris to Shell Development Company.

Making polyvinyl fluoride comprises heating vinyl fluoride in contact with water in amount of 0.1 to 10 times weight of vinyl fluoride and with from 0.005 to 5% by weight of vinyl fluoride of vinyl polymerization catalyst under pressure in excess of 100 atmospheres at 30° C. to 250° C. No. 2,419,008. Donald D. Coffman and Thomas A. Ford to E. I. du Pont de Nemours & Company.

Obtaining polymeric material from vinyl fluoride comprises heating mixture of vinyl fluoride with terminally unsaturated olefin in contact with inert liquid medium and from 0.005% to 5% based on weight of vinyl fluoride and olefin of vinyl polymerization catalyst under pressure of from 100 to 1000 atmospheres, at 30° C. to 200° C. No. 2,419,009. Donald D. Coffman nad Thomas A. Ford to E. I. du Pont de Nemours & Company.

Xylene-insoluble polyvinyl fluoride which has intrinsic viscosity of at least 0.35 and which, when in form of filament, is capable of being cold drawn to permanent elongation of at least 100% from molecularly unoriented state exhibiting X-ray diffraction pattern characteristic of crystalline powder to molecularly oriented state showing by X-ray diffraction patterns orientation along fiber axis. No. 2,419,010. Donald D. Coffman and Thomas A. Ford to E. I. du Pont de Nemours & Company.

Manufacturing molding powder comprises mixing in dough mixer soluble derivative of cellulose from group consisting of cellulose esters of organic acids and cellulose ethers, plasticizer therefor, and hot-acting volatile solvent therefor, at temperature above effective temperature of solvent to form homogeneous mass, etc. No. 2,419.035. Joseph L. Quinn and Ewald G. Spader to E. I. du Pont de Nemours & Company.

Combustible synthetic resins. No. 2,419,043. Thaddeus Urbanski.

Copolymer of 25 to 75 per cent of vinyl furane and 25 to 75 per cent of compound having molecular structure described in patent. No. 2,419,-057. Albert M. Clifford to Wingfoot Corporation.

Making colloidal dispersions of rubberlike reaction product of inorganic polysulfide and an olefin dihalide. No. 2,419,060. John Edwardes to Clare L. Brackett.

In manufacture of emulsion polymers, process comprises polymerizing aqueous emulsion comprising mixture of major proportion of butadiene-1,3 and minor proportion of styrene in presence of 0.01% to 2% of peroxy compound catalyst and from 0.002% to 0.15% of activator consisting of silver nitrate. No. 2,419,090. Leo W. Rainard to General Latex and Chemical Corporation.

Copolymers of vinyl chloride interpolymerized with trialkyl ester of aconitic acid in proportion of 80% to 95% of vinyl chloride and 20% to 5% of ester on total weight of monomers. No. 2,419,122. Fred W. Cox to Wingfoot Corporation.

Preparing thermoset copolymer of monomeric mixture of from 10 to 25 percent vinylidene chloride and balance of vinyl chloride. No. 2,419,-166. Thomas H. Rogers, Jr., and Robert S. Vickers to Wingfoot Corporation.

Polymerizing rosin included step of adding fluosulfonic acid to rosin to assist in polymerization. No. 2,419,185. Clinton A. Braidwood and Almon G. Hovey to Reichhold Chemicals, Inc.

Polymerizing in aqueous emulsion, monomer mixture, containing 70 to 80% by weight styrene, 10 to 25% by weight ethyl acrylate and 5 to 10% by weight of butadiene-1,3 of formula described in patent. No. 2,419,202. Gaetano D. D'Alelio to General Electric Company.

Production of polyamide compositions suitable for conversion into films, filaments and other articles by shaping while in the molten state. No. 2,419,277. Robert Wighton Moncrieff, Charles William Sammons, and Edward William Wheatley to Celanese Corporation of America.

Film of polyvinyl alcohol containing 0.1% to 10% by weight of cetyl dimethyl benzyl ammonium chloride, based on weight of polyvinyl alcohol. No. 2,419,281. Max Vernon Noble to E. I. du Pont de Nemours & Company.

Polymerizing in aqueous emulsion, monomeric material consisting of vinyl chloride in presence of bis(ortho-alkoxybenzoyl) peroxide containing no substituent groups other than alkoxy groups, as catalyst. No. 2,419,-347. Vernon L. Folt and Forrest W. Shaver to The B. F. Goodrich Company.

Preparing laminated structure comprising mixing equal parts melamine-formaldehyde and plaster of Paris, adding water to convert into adhesive paste-like mass, applying alternate layers of mass and glass cloth upon suitable form, adhering and solidifying alternate layers. No. 2,419,440. John Delmonte to E. F. Lougee and Hemphill Company.

Production of methylcyclopentene dimer comprising polymerizing methylcyclopentene in polymerization zone by sulfuric acid polymerization catalyst, separating methylcyclopentene polymers from polymerization zone and fractionating methylcyclopentene polymers to separate dimer fraction. No. 2,419,668. Arthur E. Bearse & John E. Leonard to Standard Oil Company.

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* *U. S. Patents from Vol. 597, Nos. 2, 3, 4, 5.*

Composition of matter comprising mixture of alkylated diarylamine with composite condensation product, prepared by heating conjugated diolefin with diarylamine in presence of acidic condensation catalyst. No. 2,419,735. Arthur W. Sloan to The B. F. Goodrich Company.

Preparing aqueous dispersion of synthetic resin selected from group of polyvinyl chloride, copolymers of vinyl chloride and vinyl acetate, and alkyl methacrylate polymers, comprises mixing with plasticizer, etc. No. 2,419,816. Charles F. Brown to United States Rubber Company.

Laminated article having plurality of cellulosic plies bonded by adhesive comprising reaction product of hydrolyzed interpolymer of styrene and maleic anhydride and 37-77% hydrolyzed polyvinyl acetate, before reaction containing plurality of carboxyl and alcoholic hydroxyl groups. No. 2,419,880. Lee L. Blyler, John W. Clough, Charles W. Hawley and Earle C. Pitman to E. I. du Pont de Nemours & Company.

Canadian

Process of rendering polyvinyl acetate resin and wax compatible in a normally incompatible mixture thereof by admixing the wax with unvulcanized rubber. No. 441,934. Shawinigan Chemicals, Ltd. (George James Manson).

Resinous product of reaction of ingredients comprising an aldehyde and s-triazinyl-2,4,6 tri-(thio acetyl urea). No. 442,023. Canadian General Electric Company, Ltd. (Gaetano F. D'Alelio).

Resin comprising the product of reaction of ingredients comprising urea, formaldehyde and (benzone sulphonyl hydrazino) diamino s-triazine. No. 442,024. Canadian General Electric Company, Ltd. (Gaetano F. D'Alelio and James W. Underwood).

Resinous reaction product of (1) a chlorinated acetamide and (2) a product of partial reaction of ingredients, including formaldehyde and a bis-(diamino pyrimidyl thio) diethyl ether. No. 442,200. Canadian General Electric Company, Ltd. (Gaetano F. D'Alelio and James W. Underwood).

Reclaiming a dimethyl silicone elastomer by treating with a small amount of dimethyldihalogenosilane. No. 442,204. Canadian General Electric Company, Ltd. (James G. E. Wright and Curtis S. Oliver).

Reducing the viscosity characteristics of cellulose nitrate by heating in an aqueous acid solution of an oxidizing agent. No. 442,207. Canadian Industries, Ltd. (James Raymond Buckley).

An unoriented, cold-drawable filamentous structure composed of a synthetic linear polyamide. containing homogeneously dispersed finely divided titanium dioxide. No. 442,211. Canadian Industries, Ltd. (Edgar William Spanagel).

Composition comprising cellulose acetate and dimethyl azelate as the sole plasticizer therefor. No. 442,223. Canadian Industries, Ltd. (Joseph Lawrence Quinn).

A polymer of acrylonitrile containing in the polymer molecule at least 85 per cent by weight of acrylonitrile dissolved in a dimethyl amide nitrile compound. No. 442,224. Canadian Industries, Ltd. (Virgil Leland Hansley).

Method of increasing the viscosity of a butyl alcohol solution of a formaldehyde-urea reaction product. No. 442,306. Libbey-Owens-Ford Glass Company (Plaskon Company, Inc. John A. Murray and George H. Metzger).

**Processes and Methods*

Reacting gaseous materials in presence of solid catalyst wherein cyclic flow of reactants and catalyst is maintained in reaction step, cyclic flow including upflowing and downflowing columns having common axis, improvement which resides in imparting mechanical rotative energy in upper portion of upflowing column whereby lineal flow of reactants and catalyst is accelerated in separate columns. No. 2,418,857. Charles W. Stratford, Joe A. Altshuler and David H. Putney to Stratford Development Corporation.

Catalyst circulation and separation for processes in which gaseous materials are reacted in presence of a solid catalyst, catalyst regenerated, regenerated catalyst returned to reaction step for reuse and entrained catalyst separated from gases in both reactor and regenerator, improvement resides in establishing rings of moving catalyst in both reactor and regenerator, rings having concentric upflowing and downflowing columns, etc. No. 2,419,088. David H. Putney to Stratford Development Corp.

Atomizing liquid to produce diverging conical stream of minute globules, comprises releasing plurality of gaseous streams under pressure into cylindrical chamber, prior to expansion of gaseous streams introducing liquid to be atomized. No. 2,419,365. Theodore Nagel.

**Rubber*

Method and apparatus for vulcanizing strip material. No. 2,418,976. Grosvenor D. Marcy to Boston Woven Hose & Rubber Company.

Preservation of synthetic rubber. No. 2,419,354. Louis H. Howland and Byron A. Hunter to United States Rubber Company.

Producing non-cracking pigmented rubber particles. No. 2,419,512. Vincent C. Vesce to Harmon Color Works, Inc.

Making cords for use as reinforcements in rubber articles comprises applying adhesive to cord maintained under tension, formed of continuous filaments of regenerated cellulose, drying treated cord under tension. No. 2,419,922. Emerson A. Tippetts to E. I. du Pont de Nemours & Company.

Canadian

Process of preparing a plastic conversion product of an elastic polycholoroprene. No. 441,871. Dominion Rubber Company, Ltd. (Louis Harold Howland).

Rubber hydrochloride film plasticized with a sufficient amount of an alkoxyalkyl ester of an unsaturated fatty acid to increase its carbon-dioxide transmission rate. No. 441,960. Wingfoot Corporation (LaVerne Emerson Cheyney).

**Specialties*

Preparing oil-in-water air sensitive emulsions of soap-free bodied esters of polyhydric alcohol formed with acids of fatty oils. No. 2,418,451. Laszlo Auer.

Preparing oil-in-water type air sensitive emulsions of fatty oils, which yield solid and coherent films upon demulsification. No. 2,418,452. Laszlo Auer.

Preparing oil-in-water type air sensitive emulsions of fatty oils, which yield solid and coherent films upon demulsification. No. 2,418,453. Laszlo Auer.

Insecticidal composition comprising mineral oil, insecticidal toxicant, malate of condensation product of ethanol ethylene diamine and mixture of stearic and palmitic acids. No. 2,418,652. Kenneth E. Maxwell to Shell Development Company.

Hair treating paste for operation at room temperature, comprising emulsifier containing polyglycol monostearate and stearyl amide, sodium hydroxide, phhoglycolic acid, ammonia, ammonium sulphite, sodium lauryl sulphate, water. No. 2,418,664. Harry R. Ramsey.

Dry pulverulent composition comprising mixture of magnesium oxide and discrete particles of normally solid bitumen. mixing with magnesium chloride solution to produce creamy consistency, setting to hard water-resistant and fire-resistant state. No. 2,418,795. Max Skolnik.

Brush contact element including block of finely divided carbonaceous material, finely divided copper, cadmium sulphide. No. 2,418,810. Philip L. Alger to General Electric Company.

Electrical contact element including block of carbonaceous material, metal, sulphide of metal. No. 2,418,811. Roy L. Adams and Lyall Zickrick to General Electric Company.

Electrical contact element including 30 to 15 percent carbonaceous material, 35 to 60 percent copper, 40 to 20 percent silver sulphide. No. 2,418,812. Fred Girvin to General Electric Company.

Dielectric structure comprising absorbent cellulosic material impregnated with castor oil. No. 2,418,820. George F. Coggins and John Francis Ahearn to Aervox Corporation.

Laminated denture comprising portion of glass fabric, impregnated with modified vinyl butyral, portion of acrylic resin bonded to fabric on exposed side of denture, portion comprising mixture of acrylic resin and polystyrene, bonded to fabric on tissue side of denture. No. 2,418,833. La Mar W. Harris and Lloyd W. Colton.

Compounded lubricant comprising mineral lubricating oil base and at least corrosion-inhibiting amount of reaction product of 0.02 to 3 atomic proportions of elemental sulfur with one molecular proportion of metal salt of sulfonic acid. No. 2,418,894. John G. McNab and Dilworth T. Rogers to Standard Oil Development Company.

Cleaning composition for removing sludge from internal combustion engines consisting of homogeneous liquid mixture of solvent composed of acetate ester of glycol monoalkyl ether and methyl amyl acetate 50% to 80% by volume, lubricating oil 15% to 25%; 4% to 25% water; 5% to 20% of morpholine soap coupling agent. No. 2,418,908. George M. Skinner to National Carbon Company, Inc.

Cleaning composition for removing sludge from internal combustion engines consisting of homogeneous liquid mixture of solvent composed of glycol monoalkyl ether, higher molecular weight aliphatic ketone, and methyl amyl acetate 50% to 80% by volume, lubricating oil 15% to 25%; 5% to 25% water; 5% to 20% of morpholine soap coupling agent. No. 2,418,909. George M. Skinner to National Carbon Company, Inc.

Producing tanning materials free from chlorine, comprising steps of treating sulphite cellulose waste lye containing organic material with chlorine in amount of 10 to 30% of dry content of organic material present in lye so that no precipitation of chlorinated product occurs, hydrolyzing chlorinated material by heating with alkaline hydroxide until whole organically combined chlorine is eliminated again. No. 2,418,981. Oskar A. Müller.

Bastericidal and algaecidal composition comprising mixture including 40% to 60% trichlorobutanes having at least 2 secondary chlorine atoms, 5% to 20% dichlorobutane and 10% to 25% dichloropentanes, and minor amount of emulsifying agent. No. 2,419,021. Charles Warren Harnden to Shell Development Company.

Preventing attack of growing plants by borer and soil organisms including step of applying in contact with soil and adjacent to plant composition comprising volatile liquid halohydrocarbon dispersed in and on coarsely subdivided solid carrier, average particle size 1/64 inch in diameter. No. 2,419,073. Oscar H. Hammer to The Dow Chemical Company.

Composition of matter for use between metal joint surfaces to prevent seizing of surfaces after heating and cooling cycles comprising 34 to 44% petroleum lubricating oil, 9 to 15% of stearate of group consisting of lithium stearate and barium stearate, 11 to 25% talc, 19 to 27% flaked graphite. No. 2,419,144. John P. Kelly to Champion Spark Plug Company.

In preparing lubricants, reacting unpolymerized organic oxygen-containing compound forming oil-soluble metal phosphorus sulfide reaction products and having boiling point not less than 300 F. with phosphorus pentasulphide at temperature above phosphate formation, converting product into barium compound. No. 2,419,153. John M. Musselman and Herman P. Lankelma to The Standard Oil Company.

Abrasive comprising backing of cellulosic sheet coating comprising proteinaceous adhesive and ethylene glycol ester of pine wood resin having petroleum hydrocarbon insolubility of 30 to 95%, and abrasive grains embedded in coating. No. 2,419,194. Allen C. Barwell to Hercules Powder Company.

Wood preserving impregnant, reformed petroleum oil boiling between 210-355° C., 70% of materials of ring structure content and 15-20% of residue above 315° C., fraction 315-355° C. of which has specific gravity falling between 1.1175-1.3888. No. 2,419,212. Jacquelin E. Harvey, Jr., Robert H. White, Jr., and Joseph A. Vaughn to one-half to said Harvey and one-half to Southern Wood Preserving Company.

Sealing composition for lining of joints of food containers comprises in combination homogeneous mixture of ethyl cellulose, vegetable oil of class of castor oil and soy bean oil as plasticizer, hydrogenated rosin as resin extender and finely divided inert filler. No. 2,419,224. Paul W. Millelot, Jr., to American Can Company.

Lubricant consisting of grease base having mechanically suspended finely divided, impalpable solid scarifying agent for making minute grease-retaining scratches on wearing surface lubricated. No. 2,419,253. Lysle D. Cahill to Jack & Heintz Precision Industries, Inc.

Making rugged carbon monoxide oxidation catalyst comprises admixing slurry of basic iron precipitate selected from carbonate and hydroxide with magnesium oxide, admixing slurry of precipitated aluminum oxide compound with magnesium oxide, adding potassium dichromate, mixing admixtures, extruding resultant mixture into formed shapes, and drying. No. 2,419,255. Joseph G. Dely to Tennessee Valley Authority.

Fungicidal composition comprising benzothiazolesulfenamide as active ingredient, and carrier selected from powdered solid carriers, and water containing dispersing agent. No. 2,419,294. Joseph B. Skaptason to United States Rubber Company.

Lubricating oil composition comprising major portion lubricating oil, additive to improve stability additive comprising metal compound of reaction product of oxygenated petroleum hydrocarbon and phosphorous pentasulphide. No. 2,419,325. John M. Musselman to The Standard Oil Company.

Non-corrosive composition comprising organic material having pH at least 7 coming in contact with water during useful life having dissolved therein nitrite salt of a secondary amine. No. 2,419,327. Aaron Wachter and Nathan Stillman to Shell Development Company.

Lubricating oil composition. No. 2,419,360. John G. McNab, Carroll J. Wilson and Carl Winning to Standard Oil Development Company.

Composition comprising long-chain acylamidomethylene-quaternary-ammonium chloride in paste form, liquid phase being essentially alcohol liquid at room temperature and concentration of chloride in paste being 40% by weight. No. 2,419,399. Ernest Paul Hartsfield and Joseph Lester Richmond to E. I. du Pont de Nemours & Co.

** U. S. Patents from Vol. 597, Nos. 2, 3, 4, 5.*
Canadian from June 3-June 24, 1947.

Saw blade lubricant comprising on weight basis, 70 to 80% of wax having melting point about 143° F. taken from paraffin wax, carnauba wax, ceresin wax, and candelilla wax, 20 to 30% of soda base grease, 4 to 5% of cutting oil taken from turpentine, rosin oil and pine oil and .5 to .7% of aluminum stearate. No. 2,419,713. Edmund L. Flood to Consolidated Vultee Aircraft Corporation.

Magnetic core material comprising particles of powdered magnetic material bonded by polymerized alcohol ester of carboxylic acid. No. 2,419,847. Armin F. Mittermaier to General Electric Company.

Production of colored smokes for signals and like, comprising mixture of organic dyestuff ignitable heat producing compound when ignited will be consumed and volatilize dyestuff to produce colored smoke, and urea for stabilizing combustion. No. 2,419,851. John W. Orelup.

Control of seed and plant diseases comprising toxic amount of compound of formula described in patent. No. 2,419,888. Kenneth G. Nolan and Ingenuin Hechenbleikner to American Cyanamid Company.

Canadian

An eraser composition comprising approximately 80 parts by weight of abrasive and colouring material, 17-6 parts by weight of polyvinyl acetate, 1-2 parts by weight of dibutyl phthalate and 1-2 parts by weight of rosin. No. 441,936. Sun Chemical Corporation (Stanley H. Southard).

Pest control adhesive composition comprising a water-soluble solid free aliphatic amine and a water-soluble aliphatic amine salt containing at least 8 carbon atoms in linear chain with the amino group together with sufficient water to form a paste. No. 442,209. Canadian Industries, Ltd. (Clarence Arthur Littler).

Lubricant comprising a lubricating oil having incorporated therein a naphthenyl trithiophosphite. No. 442,282. E. I. du Pont de Nemours & Co. (Paul Lawrence Salzberg).

Lubricating oil composition containing the barium salt of 2-launpyl-4-amyl phenol monosulphide. No. 442,427. American Cyanamid Company (Elmer W. Cook and William D. Thomas).

Lubricating oil composition containing di-(2,4-diamyl phenethanol) monisulphide. No. 442,428. American Cyanamid Company (Elmer W. Cook and William D. Thomas).

Lubricating oil having dispersed therein 0.1-3 per cent of barium octyl salicylate monosulphide. No. 442,429. American Cyanamid Company (Elmer W. Cook and William D. Thomas).

*Textiles

Rendering textiles and fabrics permanently not inflammable, water resistant and mildew proof, comprising passing materials through aqueous solutions containing pyrophosphoric acid and melamine, drying between 120 to 140° C. No. 2,418,525. Frederick F. Pollak.

Improving dyeing properties of cellulosic material by treating before dyeing with aqueous solution containing aliphatic aldehyde, and a compound represented by formula described in patent. No. 2,418,696. Walter Glen Cameron and Thomas Henry Morton to Courtaulds, Limited.

Twisted textile filamentary material having twist set with unctuous solid comprising higher fatty acid ester of ether condensation product of polyol. No. 2,418,752. Kenneth R. Brown to American Viscose Corporation.

Composition for rendering fabric rot- and fire-resistant, comprising: 20 lbs. polyvinyl chloride, 8 lbs. zinc carbonate, 8 lbs. tricresyl phosphate, 7 lbs. triphenyl phosphate, 45 lbs. acetone, 7 lbs. inert pigment, 0.8 lb. zinc naphthenate, ½ lb. pentachlorphenol. No. 2,418,843. Martin Leatherman.

Treating synthetic yarns in production of sheer knit goods, comprising, in combination, sizing yarn at bath heated to not less than 40° C. with self-emulsifiable mixture of hydrogenated oil, solid fatty acid and soap, mixture having melting point of 40° C. to 70° C. and iodine value not exceeding 30, etc. No. 2,418,927. Herbert Freund.

Making yarn from long hard raw fibre selected from group consisting of natural and synthetic vegetable origin. No. 2,418,995. Samuel E. Thomas and Walter R. Guthrie.

Apparatus for manufacturing long fibre into yarn. No. 2,418,996. Samuel E. Thomas and Walter R. Guthrie to Lehigh Spinning Company.

Apparatus for manufacturing long fibre into yarn. No. 2,418,997. Samuel E. Thomas and Walter R. Guthrie to Lehigh Spinning Company.

Apparatus for manufacturing long fibre into yarn. No. 2,418,998. Samuel E. Thomas and Walter R. Guthrie to Lehigh Spinning Company.

Sizing dried spun cake of rayon comprises impregnating cake with aqueous emulsion of non-mucilaginous unctuous material having softening point of 30° C. to 70° C. selected from soapy and waxy materials, etc. No. 2,419,756. Luther Bishop Arnold, Jr., to E. I. du Pont de Nemours & Company.

*Water, Sewage and Sanitation

Potable water from salt solutions, comprising insulated container evaporator, scraper elements adjacent evaporator whereby ice crystals may be removed, means for admitting water to container, rotatably mounted drum structure at top of container, etc. No. 2,419,881. William F. Borgerd and John S. Palmer to International Harvester Company.

Cellulose

In continuous esterification of dissolved and reprecipitated cellulose material with retention of its structure to produce at least monoacylated cellulose esters which are insoluble in organic solvents by impregnating material with solution of catalyst, removing solvent impregnating with liquid anhydride of organic acid containing at most 4 carbon atoms, heating to effect acylation, etc. No. 2,420,499. Andreas Ruperti to Society of Chemical Industry.

Shaped cellulosic products in form of filaments, ribbons and unsupported films which have good wet strength which are insoluble in water, in solutions of alkalies and in solutions of acids, which consist of carboxyalkyl Cellulose excess alkali solution and which contain zirconium attached to carboxyalkyl groups of cellulose ether in amount equivalent to 3% to 9% of ZrO_2. No. 2,420,949. Onslow B. Hager and Louis H. Bock to Rohn & Haas Company.

Ceramics

New article of manufacture, lamination comprising in combination, two layers of glass, two elements comprising quarter-wave retardation material positioned between glass layers, birefringent crystalline element positioned between quarter-wave elements and comprising material

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* *U. S. Patents from Vol. 597, Nos. 2, 3, 4, 5.*

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having coefficient of thermal expansion different from that of glass, thick layer comprising resilient adhesive material bonding crystalline element to each quarter-wave elements, layer of light-polarizing material bonded between each of quarter-wave elements and glass layers with axis at angle of 45° to vibration direction of quarter-wave element adjacent thereto. No. 2,420,279. Clinton J. T. Young to Polaroid Corporation.

Dielectric composition having controllable temperature coefficient of capacity comprising entirely predetermined quantities of titanates of at least two of the alkaline earth metals calcium, strontium and barium and having dielectric constant greater than 144. No. 2,420,692. Eugene Wainer to The Titanium Alloy Manufacturing Company.

New article of manufacture composed of diamond abrasive grain and ceramic bond containing no silica in which phosphates predominate to control physical characteristics of bond. No. 2,420,859. Orello S. Buckner to Bay State Abrasive Products Company.

Making insulating refractories comprises mixing and tempering to dry press consistency 10.0% by weight of plaster of Paris 10.7% sawdust, 30.0% plastic fire clay, 15.0% Missouri bituminous coal, 17.5% fire clay grog, 16.8% water, dry pressing mix into green brick, burning green brick. No. 2,420,863. Glen W. Charles to A. P. Green Fire Brick Company.

Apparatus for polishing flat glass. No. 2,420,989. Frederic Barnes Waldron to Pilkington Brothers, Ltd.

Apparatus for simultaneously cutting out and edging lenses made from organic plastic. No. 2,421,065. Howard G. Hoffer.

Canadian

Optical glass consisting of beryllium oxide, 12 to 25 parts, boric oxide, 2 to 20 parts, phosphoric oxide, 65 to 85 parts. No. 442,737. Canadian Kodak Company, Ltd. (Kuan-Han Sun and Maurice L. Huggins).

Impression material capable of yielding durable, hard-surfaced plaster forms cast in moulds made from a soluble alginate, a gel-precipitating quantity of hydrated calcium sulphate, tri-sodium phosphate, magnesium carbonate, and dead-burned calcium sulphate. No. 443,051. Coe Laboratories, Inc. (Vance V. Vallandigham).

Coatings

Resinous coating composition comprising oil-free polymerizable phenol formaldehyde resin dissolved in solvent of steam-distilled pine oil, 18 parts, ethyl alcohol 50 parts, butyl alcohol 32 parts. No. 2,420,134. Charles H. Hempel and Francis J. Ploederl to Heresite & Chemical Company.

Laminated electrical insulating material comprising mica flakes bonded together with resin composition comprising polymer of isobutylene. No. 2,420,172. Robert L. Griffeth and Joseph J. Pickney to Mica Insulator Company.

Coating composition comprising drying oil pigmenting agent consisting of drying-oil insoluble condensation product of saturated acyclic aldehyde with saturated acyclic aldehyde with saturated acyclic ketone, containing adsorbed dye, and drying agent for oil. No. 2,420,390. Thomas C. Whitner to Chemical Laboratories, Inc.

Providing base with synthetic resin surface comprises applying to base poly-unsaturated polymerizable ester which contains at least two polymerizable unsaturated carbon-carbon radicals separated by ester linkage, ester containing polymerization catalyst for ester, applying coating of water soluble film forming material to ester, polymerizing ester, removing water soluble film from polymerized ester. No. 2,420,720. Alphonse Pechukas and Paul J. Gegner to Pittsburgh Plate Glass Company.

Depositing film of material on surface of body in evacuated chamber. No. 2,420,724. Richard M. Rice to Bausch & Lomb Optical Company.

Hard, oil-soluble resins formed by esterification of reactants consisting essentially of rosin acids and polypentaerythritols having no more than three linked pentaerythritol nuclei. No. 2,420,926. Gilbert R. Anderson to Hercules Powder Company.

Coating composition comprising cellulose-acetopropionate and an alkyd resin. No. 2,421,001. Harry K. Ash Interchemial Corporation.

Apparatus for coating articles comprising spray unit actuable to spray coating material in given path, electrically operable means to actuate unit, etc. No. 2,421,343. Nelson H. Mageoch to Western Electric Company, Inc.

Canadian

Producing a pigment dissolving alum in water, dissolving sulphur dioxide in the resulting alum solution, and adding the solution of alum and sulphur dioxide to a milk of lime suspension. No. 443,122. West Virginia Pulp & Paper Company (Gerald Haywood).

Dyes, Pigments

Disazo dye of formula A—N N—Y where A is azo benzene residue and Y is residue of N-alkyl aniline having as substituent in meta position to N-alkylamino group amino group acidylated with aliphatic monocarboxylic acid containing from 16 to 18 carbon atoms residue Y being united to azo group at para position to alkylamino group. No. 2,420,008. Henry Charles Olpin, Edmund Stanley, and Christopher Stanley Argyle to British Celanese Limited.

Acylamino-anthraquinone vat dyestuffs. No. 2,420,453. Paul Sutter and Walter Kern to Society of Chemical Industry.

Diazo dye compounds. No. 2,420,630. George J. Taylor to Eastman Kodak Company.

Diazo compounds of the pyrazolone formula described in patent. No. 2,420,791. Abby Ware Nies to American Cyanamid Company.

Chromium complex of dye represented by formula described in patent. No. 2,421,315. Boyce Galloway Carson to E. I. du Pont de Nemours & Company.

Canadian

Diazo derivative of guanidyl carboxylic acid. No. 442,850 American Cyanamid Company (Hans Z. Lecher, Robert P. Parker and Henry Philip Orem).

Equipment

Electric arc furnace control having charge portion in which material to be melted is placed and power circuit including relatively movable electrode, control means responsive to deviation of power factor in power circuit from predetermined value, etc. No. 2,419,988. Ronald F. Davis to Northwestern Steel and Wire Company.

In mechanism for pumping fluid, two reservoirs comprising driving fluid, means operatively connecting two reservoirs for maintaining difference of pressure of fluid there between, two chamber, each chamber having flexible diaphragm separating it into two compartments, containing delivery fluid and driving fluid, etc. No. 2,419,993. William G. Green and Jay Callahan to Engineering Laboratories, Inc.

Indirectly heated cathode comprising tubular emitter element of sheet material having core layer of thorium interposed between sheath layers of tantalum. No. 2,420,014. George T. Rayfield to Eitel-McCullough, Inc.

In appartus for filtering wax from oils, elongated blending chamber having inlet near one end for heated stream of wax bearing oil and outlet near opposite end blending chamber also having series of intermediate inlets for cooled dewaxing solvent to be mixed with and dissolved in wax bearing oil, etc. No. 2,420,418. Eddie M. Dons and Oswald G. Mauro to Mid-Continent Petroleum Corporation.

Continuous gas analyzing apparatus containing pair of pressure and flow regulating devices means for connecting supply of gas to be analyzed, and air, both under pressure, each to one of devices combustion chamber connecting with and to which devices discharge and wherein any combustible present in gas is combined with oxygen from air supply, etc. No. 2,420,430. Clarence Johnson to Bailey Meter Company.

Artificially integrated and shaped friction material comprised of insoluble and nonporous substance comprising by weight asbestos from 30-80 per cent and reaction product of from 20-50 per cent of mixture of aluminum sulphate and calcium phosphate in molecular proportions of from 10-30 per cent barium carbonate. No. 2,420,475. Herbert H. Greger and Southwick W. Briggs.

Making artificial piezoelectric element comprises, providing quantity of finely divided piezoelectric material, suspending material in fluid medium orienting material with respect to piezoelectric axes, separating material and medium while material is maintained in oriented condition. No. 2,420,652. Constantin Chilowsky.

Apparatus of continuous flow type for separating phases of emulsion. No. 2,420,687. Arthur D. Small.

Apparatus for treating air to produce stream of air of substantially constant water vapor content. No. 2,420,993. Gilbert A. Kelley to Surface Combustion Corporation.

Spraying apparatus comprising canister for holding spraying material, air cylinder in axial alignment with receptacle piston within cylinder external handle for reciprocating piston, etc. No. 2,421,183. Courtenay Cakebread.

Differential pressure operating dry-pipe fire extinguishing system for discharging extinguishing fluid under pressure and normally containing controlling body of air under pressure. No. 2,421,303. Stephen T. Van Houten.

In colorimeter, housing; source of light, photoelectric cell and means for suspending specimen between source of light and photo-electric cell for transmission of light rays from source through suspended specimen onto photoelectric cell, etc. No. 2,421,344. Morris Mass.

Atomiser for mixing liquid and gas that is readily assembled and disassembled for cleaning. No. 2,421,359. Thomas Scott Sutherland.

Explosives

Blasting cap containing base charge of pentaerythritol tetranitrate, primer charge comprising N-methyl gluconamide pentanitrate, and ignition composition comprising diazo-initrophenol grained with N-methyl gluconamide pentanitrate. No. 2,420,306. William F. Filbert to E. I. du Pont de Nemours & Company.

Machine for loading subcaliber ammunition in belt. No. 2,420,664. Chester E. Hoskins.

Filler fixture for loading explosive charge into shell having internally threaded opening. No. 2,420,668. Thomas F. Knight.

Underground prospecting apparatus comprises means for detonating charge of explosive seismographs for detecting eleastic waves in ground, amplifiers coupled with seismographs. No. 2,420,672. Raymond Maillet.

Priming composition for thermite mixtures consisting of 57% copper oxide, 40% metallic manganese, 3% sulphur said composition having reaction temperature of at least 1400°C. No. 2,421,029. Sidney J. Magram.

Food

Modification of protein to reduce its water absorptive properties comprises treating protein with treating agent comprising mixture of nitrous acid and highly ionized strong mineral acid selected from hydrochloric acid and sulfuric acid. No. 2,420,735. John Robert Coffman and Harry F. Lewis to General Mills, Inc.

Modified protein characterized by reduced water absorption protein having major proportion of its peptide bonds intact and having ammonium groups and primary amide groups converted to COOX groups in which X is a furfuryl group. No. 2,420,736. John Robert Coffman and Harry F. Lewis to General Mills, Inc.

Recovery of flavanone glycosides comprises adding to plant material containing flavanone glycosides lime to coagulate slimy components of plant material and adjusting alkalinity of aqueous suspension of plant material to point sufficiently alkaline to result in formation of soluble compounds of flavanone glycosides, etc. No. 2,421,061. Ralph H. Higby to California Fruit Growers Exchange.

Recovery of naringin comprises adding to plant material containing naringin, lime to coagulate slimy components of plant material, adding caustic soda to lime treated material to increase alkalinity of aqueous suspension of plant material recovering liquor containing naringin. No. 2,421,062. Ralph H. Higby to California Fruit Growers Exchange.

Preparation of naringin comprises adding to plant material containing naringin alkaline earth compound and water to adjust alkalinity of mixture recovering liquor containing naringin. No. 2,421,063. Willard E. Baier to California Fruit Growers Exchange.

Making pectin sugar jelly of salvy texture comprising treating pectin-containing jelly batch at acidity corresponding to pH range of 4.0 to 7.0 for from 5 to 30 minutes at 180° to 220°F. No. 2,421,093. Donald R. Thompson to California Fruit Growers Exchange.

Producing protein hydrate comprising forming mixture of water and isolated protein selected from peanut protein and soybean protein, quantity of water being 50% of hydrate and hydrate having pH of 7.0. No. 2,421,113. Raymond S. Burnett and Earl J. Roberts to United States of America.

Dehydrating foodstuffs by subjecting foodstuff to atmosphere containing volatile substances corresponding to selected volatile flavoring constituents inherent in foodstuff, saturating desiccant with volatile flavoring constituents while maintaining desiccant deficient in water content, circulating atmosphere through foodstuff and desiccant to reduce water content of foodstuff while retaining selected volatile flavoring constituents in foodstuff. No. 2,421,121. Arie J. Haagen-Smit to California Institute Research Foundation.

Additional patents from the above volumes will be given next month.

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

429,627. Howard O. Trerice as H. O. Trerice Co., Detroit, Mich.; filed Mar. 28, 1946; Serial No. 499,173; for filters; since Jan. 1, 1938.

429,628. Ever-Tite Alloys Corporation, New York, N. Y.; filed Mar. 29, 1946; Serial No. 499,220; for brazing alloys and welding alloys; since Mar. 18, 1946.

429,630. Leon Diamond, as Swiss Laboratory, Cleveland, Ohio.; filed April 22, 1946; Serial No. 500,648; for wax and grease removers; since Jan. 10, 1940.

429,633. Leon Diamond as Swiss Laboratory, Cleveland, Ohio; filed Apr. 26, 1946; Serial No. 500,966; for automobile body solder, brazing and welding metals; since Jan. 10, 1940.

429,640. M and M Wood Working Company, Portland, Oreg.; filed Nov. 18, 1946; Serial No. 512,787; for laminated sheet material of wood veneer and fibrous cellulosic material; since May 4, 1944.

429,717. Ralph S. Harte, San Francisco, Calif.; filed Oct. 31, 1945; Serial No. 490,830; for thin transparent or translucent sheets or films of polyvinyl resin; since Aug. 1, 1945.

477,381. Time Oil Co., Seattle, Wash., filed Dec. 9, 1944; for gasoline; since Sept. 1, 1944.

486,907. Louisiana Supply Company, Sulphur and Sulphur Mines, Sulphur, La.; filed Aug. 8, 1945; for paints; since July 3, 1945.

488,216. Gold Leaf and Metallic Powders Co.; New York, N. Y.; filed Sept. 10, 1945; for bronze powder, aluminum powder, copper powder, magnesium powder, metals of all types in powdered form; since Jan. 27, 1941.

492,470. Silby Chemcial Company, Inc., Miami, Florida; filed Nov. 30, 1945; for insecticides and insect repellent; since Aug. 26, 1944.

492,478. United States Plywood Corp., New York, N. Y.; filed Nov. 30, 1945; for impregnated paper materials; since Jan. 27, 1944.

492,887. Atlas Paint and Varnish Co., Inc., New York, N. Y.; filed Dec. 8, 1945; for readymixed paints; since Nov. 8, 1945.

495,744. International Paint Company, Inc., New York, N. Y.; filed Jan. 31, 1946; for paints; since Mar. 15, 1939.

496,470. Regal Chemical Corporation, Brooklyn, N. Y.; filed Feb. 12, 1946; for insecticide dispensers; since Dec. 6, 1945.

496,851. The Marwin Company, West Caldwell, N. J., filed Feb. 18, 1946; for metallographic abrasives and materials; since Nov. 1, 1945.

498,061. Earl Grissmer Company, Anderson, Ind.; filed Mar. 12, 1946; for cleaner for rugs, upholstery, woolens, etc.; since Feb. 7, 1946.

498,259. Carl M. Shelton, as Plystone Company Columbia, S. C.; filed Mar. 14, 1946; for semi-liquid floor resurfacing material having asphaltic base; since Feb. 11, 1946.

498,577. Binney & Smith Company, New York, N. Y.; filed Mar. 20, 1946; for product of carbon black resin and solvent for coloring paints and protective coatings; since June 22, 1938.

500,739. Celanese Corporation of America, New York, N. Y.; filed Apr. 23, 1946; for sheets, webs or batts of cellulose derivatives; since Apr. 18, 1946.

501,126. William J. Fry, Chicago, Ill.; filed Apr. 29, 1946; for plastic cintainers for waxed cardboard milk cartons; since Mar. 1, 1946.

501,312. Gene J. Crispino, as Chemo-Plastics Company, Village of Westbury, N. Y.; filed May 2, 1946; for adhesive liquid compound to provide non-skid surface on back of rugs; since Mar. 9, 1946.

501,623. The Arco Company, Cleveland, Ohio; filed May 8, 1946; for paints; since Apr. 8, 1946.

502,860. Universal Zonolite Insulation Company, Chicago, Ill.; filed May 27, 1946; for fertilizer preparation; since Oct. 19, 1943.

503,122. The Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.; filed May 31, 1946; for solvent emulsion cleaners; since February 1944.

503,123. The Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.; filed May 31, 1946; for solvent emulsion cleaners; since August 1944.

503,124. The Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.; filed May 31, 1946; for solvent emulsion cleaners; since January 1944.

503,284. Continental Ore Co., New York, N. Y.; filed June 5, 1946; for mineral mixture with base of magnesite; since Jan. 2, 1946.

503,553. Combined Metals Reduction Company, Salt Lake City, Utah; filed June 10, 1946; for slabs, bars, bricks or pigs of nonferrous metals; since Jan. 25, 1946.

504,099. John J. Duffy as J. Duffy, New York, N. Y.; filed June 18, 1946; for suspension mixture of soap, abrasive and oil for cleansing grease and removing rust; since June 3, 1946.

504,805. Universal Oil Products Company, Chicago, Ill.; filed June 28, 1946; for organic compounds to prevent or retard deterioration of petroleum products, fats and oils, and feedstuff; since Sept. 27, 1947.

504,806. Universal Oil Products Company, Chicago, Ill.; filed June 28, 1946; for organic compounds to prevent or retard deterioration of petroleum products, fats and oils, and feedstuff; since Sept. 23, 1937.

505,876. Welders Supply Company, Little Rock, Ark.; filed July 18, 1946; for oxygen and acetylene; since June 1, 1942.

505,988. Standard Oil Company of California, Wilmington, Del., and San Francisco, Calif.; filed July 20, 1946; for cleaning compounds; since May 17, 1946.

506,240. Keystone Roofing Manufacturing Company, York, Pa.; filed July 25, 1946; for thermal insulating material, consisting of asphalt saturated and coated paper; since Nov. 10, 1913.

506,255. Olin Industries, Inc., New Haven, Conn.; filed July 25, 1946; for loaded paper shot shells; since Feb. 7, 1905.

506,556. Tennessee Eastman Corporation, Kingsport, Tenn.; filed July 30, 1946; for secondary aromatic amine as antioxidant in lubricating oils, etc., since Feb. 12, 1946.

506,718. Hercules Powder Company, Wilmington, Del.; filed May 18, 1946; for resin; since Mar. 22, 1946.

506,832. National Starch Products, Inc., New York, N. Y.; filed Aug. 3, 1946; for resin and starch adhesives; since July 22, 1946.

506,834. Lucille Thomson Olive, Charlotte, N. C.; filed Aug. 3, 1946; for soil vitalizer; since July 13, 1946.

506,963. Edith Rose, as Executive Sales Company, Philadelphia, Pa.; filed Aug. 1, 1946; for carbon paper and typewriter ribbons; since May 1942.

507,292. Arkansas Company, Inc., Newark, N. J.; filed Aug. 13, 1946; for wetting and emulsifying agents; since May 1, 1946.

507,345. Selectronic Dispersions, Inc., Montclair, New Jersey; filed Aug. 13, 1946; for plastic compounds, alloys and dispersions used for molding; since July 29, 1946.

507,533. Kelco Company, San Diego, Calif.; filed Aug. 16, 1946; for algin product for use in water paints; since Apr. 6, 1937.

507,851. The Resinous Products & Chemical Company, Philadelphia, Pa.; filed Aug. 22, 1946; for synthetic resinous materials; since November 1937.

508,588. Dri-Zone Corp., Kansas City, Mo.; filed Sept. 6, 1946; for water-proofing compounds having asphaltic base; since Feb. 11, 1944.

515,360. Anco Manufacturing & Supply Company, Tulsa, Okla.; filed Jan. 7, 1947; for metallic bulk tanks and cylinders for liquefied petroleum gases; since Oct. 1, 1946.

Trademarks reproduced and described include those appearing in Official Gazette of U. S. Patent Office, May 6-May 27.

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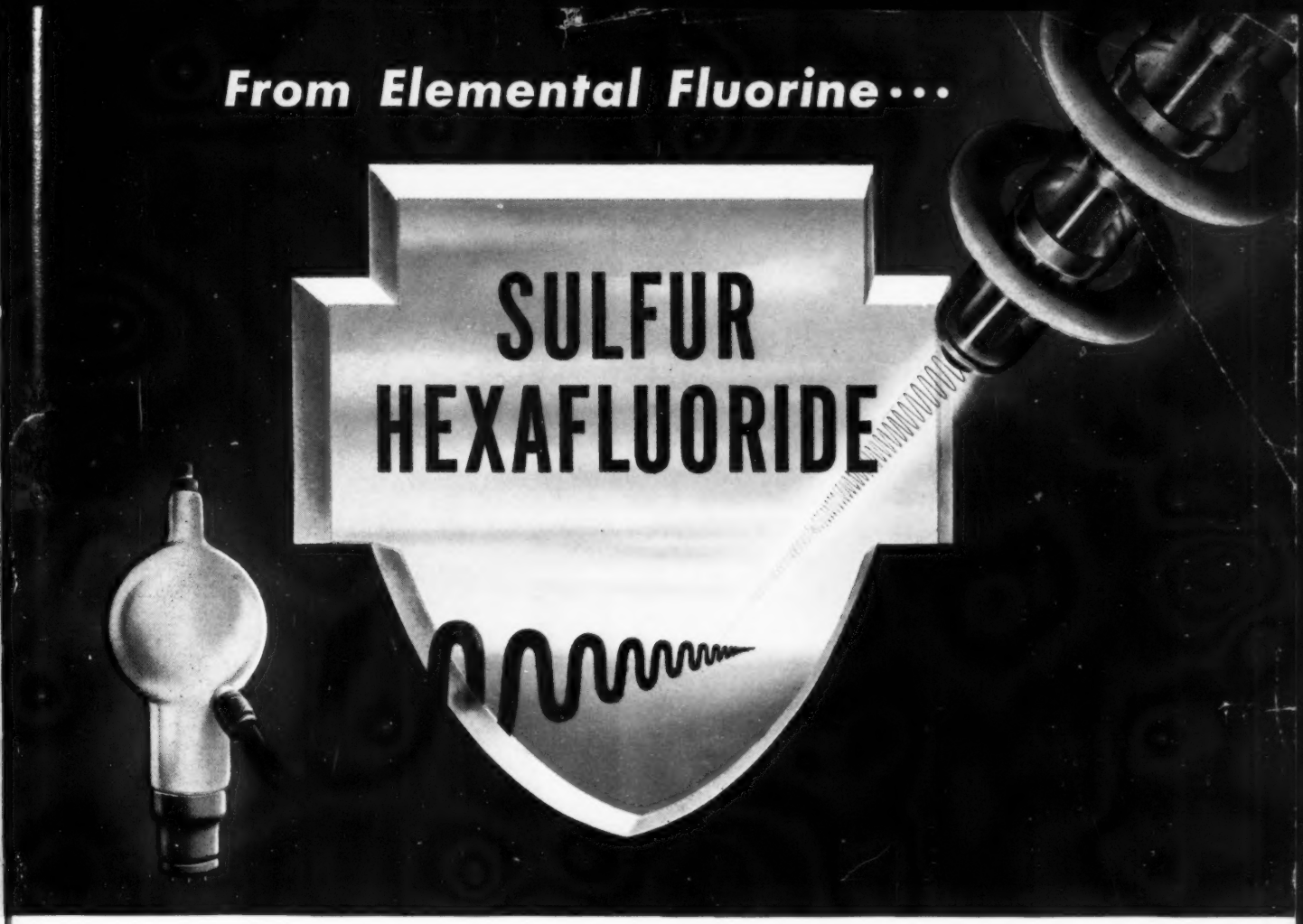

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Sublimation Temperature: —63.8°C
Critical Temperature: 45.6°C
Critical Pressure: 540 p.s.i.a.
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Temp. (°C)	Pressure (p.s.i.a.)
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—50	34
—20	102
+10	240
+40	481

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